ISASC

EQUILIBRIUM®

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

2004--- ISSUE NO. 1 PAGES 2873 - 2900

Cover Picture

From the new book *Bilance e Strumenti per Pesare le Monete* by Zavattoni. (See EQM 2891 for review.) Classified [in Italian] as **Origins**: Low Countries, French border (Namur), beginning of the 19th century, **Maker**: not identified, **Box-shape**: rectangular with a drawer, of the 'Lion-scale' style with bun feet, **Dimensions**: 273mm x 177mm x 49mm (10 3/4 x 7 x 1 3/4 inches), **Material**: wood with the top surface decorated with parquetry of the chess-board style, **Beam**: of iron, with beam-ends of the second type [well-arched swan-neck] with round pans and with a suspended mechanism activated by pulling the brass lion, **Labeled**: in the drawer with 'Money Weights' and each gold coin Labeled in French, **Weights**: 23 of square form, Low Countries: Albertin; Sovereign and half-sovereign; Austria: Ducat x 2, France: Louis the Younger and half-Louis the Younger, Louis with Maltese cross and half Louis with Maltese cross, Louis with moons and half Louis with moons, Louis x 2, 40 Francs and 20 Francs, 6 lire and 3 lire of silver, Germany: Carolus and half-carolus, United Kingdom: Guinea and half guinea Spain: 2 escudos of gold. **Fractional Weights**: 4 survive in the grain locker on the right. Note that all weights are appropriate for the currency in use, and all have a mark of a star. Provenance; Christies, 30 May, 1996, lot 26.

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Keesing Postal Scales

BY R J KOK

Fig. 1a. ⮝⮝ Probably the earliest version, before the Netherlands ran airmail. The three charts Labeled in red "Drukwerk" [first class] are on red lines. The three charts Labeled in green "Monsters" [samples] are on green lines, while the remaining charts, Labeled in black "Brieven" [letters] are on black lines, making it very simple to follow the required chart. Note the verification tag screwed to the top of the indicating arm. The letter plate is brass, but the rest is cast-iron.

Fig. 2b. ⮝⮝ The more modern lettering on version two, also in red, but with only a black line to each side.

Fig. 2c. ➢➢ The postal rates are in black and red alternately, with no green lettering. "N.O.I." is the abbreviation for Netherlands East Indies, and "N.W.I." is the abbreviation for Netherlands West Indies, former colonial possessions. The writing at right-angles to all the other writing says "LUCHTPOST" [Airmail].

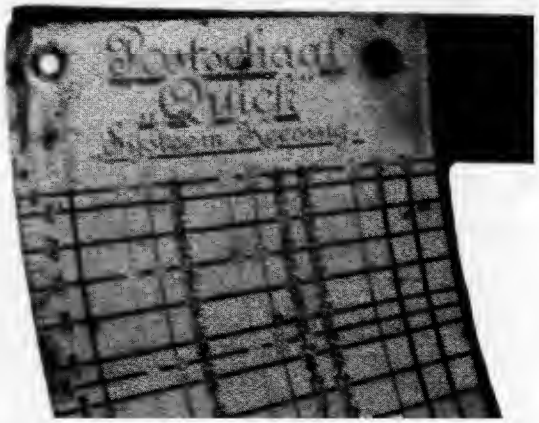


Fig. 1b. ⮝⮝ Close-up showing the attractive, early lettering. The lettering that appears to be mid-grey is in reality red all underlined in black.

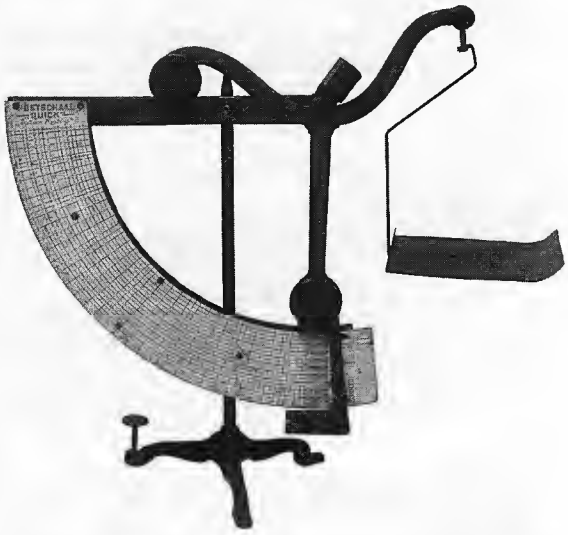
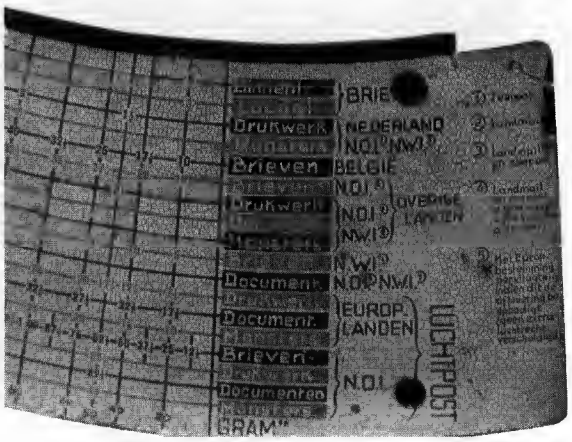


Fig. 2a. ⮝⮝ The round pillar version also made of iron, with hanging pan



This rare Dutch postal scale was designed by Isaac Keesing.[1] The earliest known date for production is 1928, but it may prove to be well before that date.

All three versions are Labeled "Postschaal Quick Systeem Keesing", but the two hanging pan versions are from about 1928, whereas the top-pan version was made c.1937.

The arc is white-painted tin-plate, with the rates and the gram units (up to 750 grams) printed on. When new rates became applicable, a new arc was printed and screwed onto the frame, so it is very possible that the frames are considerably older than the postage rates would suggest.

The versions with the hanging pans are 490mm (19½ inches) tall and the arc is 80mm (3 inches) wide. The frames are made of cast iron.

Notes & References

1. Information kindly provided by the grandson of Isaac Keesing, who still runs the private business.

2. Berning, B & J, *Scales: A Collector's Guide*, page 15 shows a fourth version. The pillar is the same as that in Fig. 1, but the lettering in the arc matches that in Fig. 2.

Author's Biography

Rein Kok is a member of *Gewichten en Maten Verzamelaars Vereniging*, the Dutch society for collectors of Weights and Measures, the first society for weight collectors. Rein has contributed many interesting articles to their Journal, *Meten & Wegen*.

Fig. 3a. ⋎⋎ The art-deco version with the top-pan, made c.1937. The fixed parts are cast iron, and the moving parts are pressed brass. The cast-iron relief prongs are all high-lighted with gold paint. Having the tripod legs so much wider apart on this version, the stability is greatly improved.

Fig. 3b. ⋎⋎ The third version of the trade name, also in red lettering with different black lines.

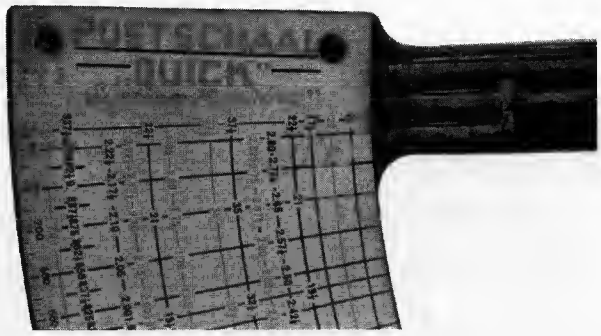
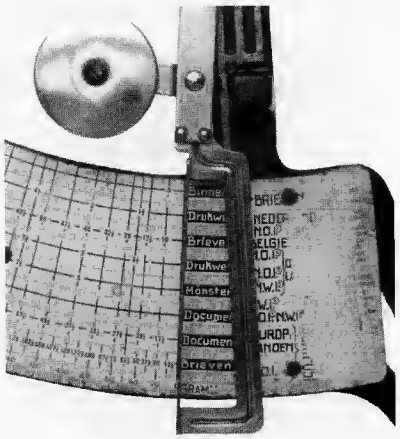


Fig. 3c. ➢➢ Close-up of the brass poise that counterbalances the weight of the half-roberval linkage and the top-pan. Note how easily the printing is removed from the white paint of the arc. The brass pressing is clearly visible. Even this later version was made when the Netherlands still had colonies.



Pelouze Bow-front Postal Scales BY P LAYCOCK

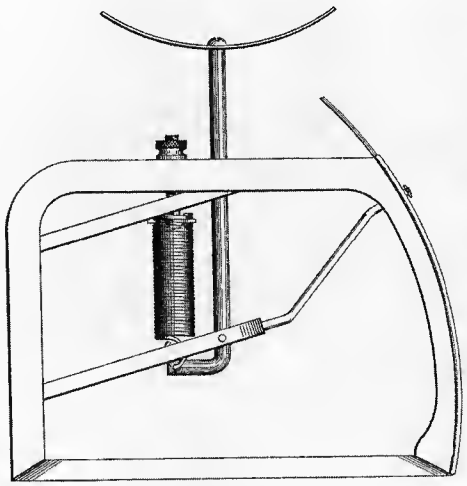


Figure 1 ⮝⮝

Figure 2 ⮝⮝

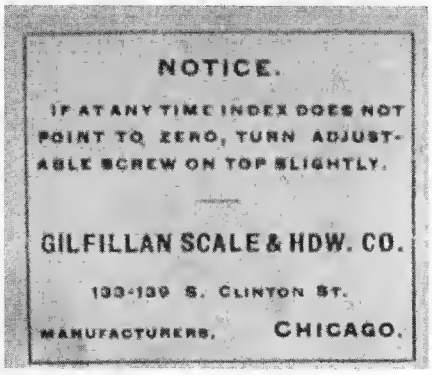


Figure 3 ⮝⮝

Did you ever wonder why so many patents were necessary for one small postal scale? That was the question that came to mind as I was examining a Pelouze Union Postal Scale. It had three patents listed, all granted between June 1896 and January 1899. Upon further examination I found two more granted in 1903 on the larger but basically similar Pelouze National Postal Scale. Wow!! That's five patents. What is it that these guys are protecting? The bow front scale looks like a pretty straightforward device. It has a spring, two pivoting arms, a pointer, a curved display panel, an adjusting screw, a letter pan and a frame. But what is even more puzzling is the fact although Pelouze had these five patents there were many other manufacturers making similar, almost identical bow front scales. So much for patents!!! But for me Pelouze is the Grand Daddy of the "Bow Front" and this article attempts to trace its history over the past 110 years.

Figure 5 ⮟⮟

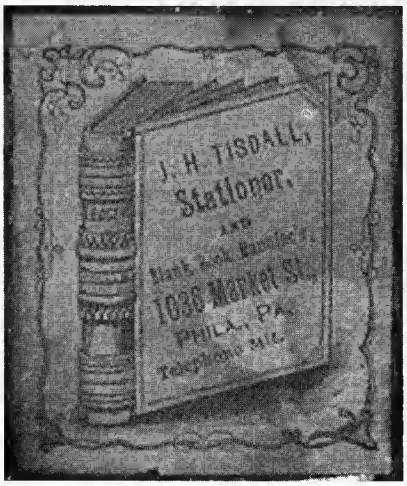
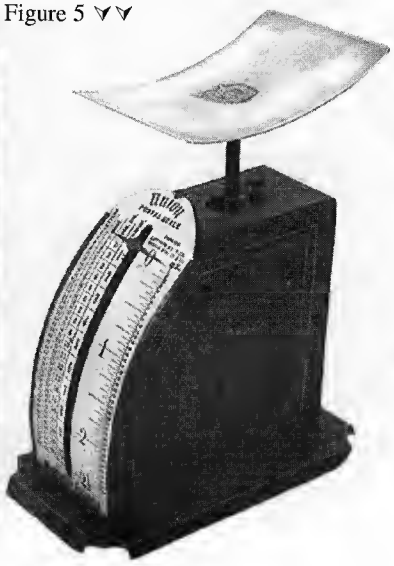


Figure 4 ⮝⮝



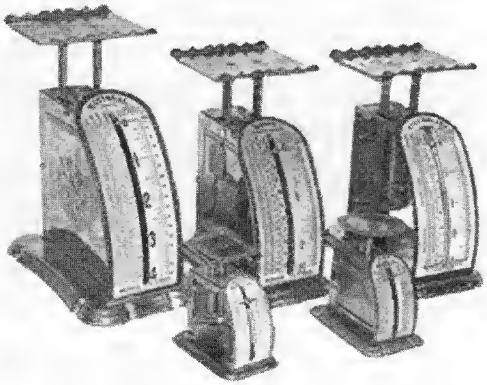


Figure 6 ⮝⮝

Figure 7

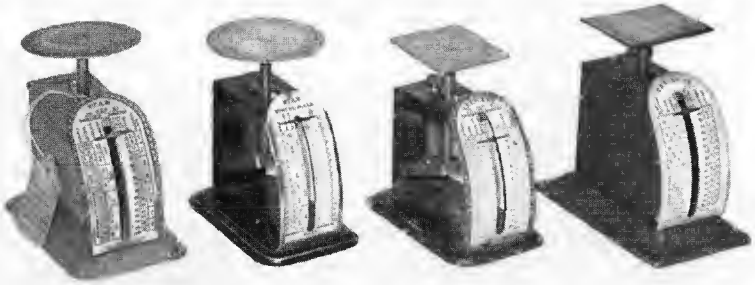


Figure 8

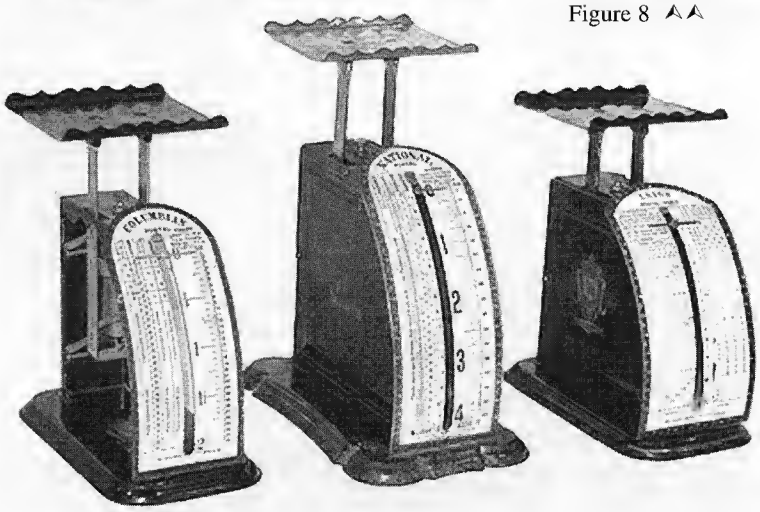


Figure 9

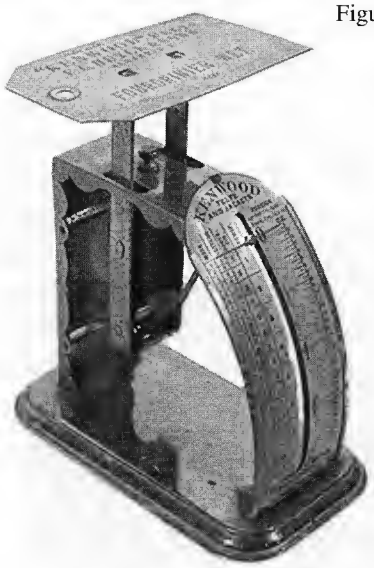


Figure 10

The Pelouze Scale & Mfg. Co. has been manufacturing scales for over 100 years. Scales to satisfy almost every need have been sold by Pelouze primarily in North America. Pelouze is probably the most successful scale marketer in the United States and has undoubtedly sold several million scales since its inception in 1894.

One area of demand targeted by Pelouze from the beginning has been postal scales. The company has offered several different styles of postal scales. The range includes small attractive letter scales to large scales used for weighing parcels. For the most part Pelouze postal scales were spring scales with the most popular styles being the bow front and the circular dial variety.

The bow front scale was patented by the Gilfillan Scale & Hdw Co. of Chicago on June 2, 1896 (figure 1). It is my assumption that shortly after the patent was granted Gilfillan was acquired by the Pelouze Scale & Mfg Co. Since that time Pelouze and many other manufacturers all over the globe have been making bow fronts.

From very early on the Pelouze Scale Company offered a wide variety of 'Adjustable Bow Front Spring Postal Scales'. Almost every U.S. collection is sure to have several of these scales.

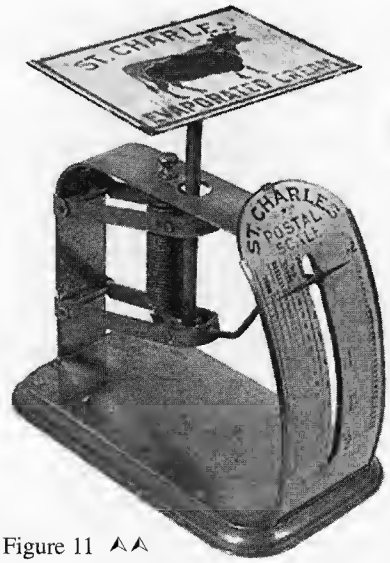


Figure 11

Figure 12

Figure 13

The oldest bow front I have found is an open sided Columbian Postal Scale made by the Gilfillan Scale & HDW. CO. (figure 2) This scale references only one patent June 2 1896. It has no reference to Pelouze, which leads me to believe that it was manufactured before Pelouze merged with Gilfillan. On the bottom is a transfer, which identifies Gilfillan as the manufacturer (figure 3). This scale has scalloped corners on the base indicative of the earliest bow fronts. The postal rates are printed on a white cellophane slide in face and are graduated up to 32 ounces. A second transfer on the bottom was applied by the retailer J.H. Tisdall, Stationer of Philadelphia PA. (figure 4).

The second scale is a Union Postal Scale. It also has the scalloped base and has side panels covering the spring mechanism (figure 5). Again the postal rates are printed on a cello face graduated up to 40 ounces. The transfer on the back identifies Pelouze as the manufacturer. There are two patent references June 2, 1896 and March 29, 1898.

From the early 1900s and for next 50 years bow front models such as Crescent, Star, Columbian, Union and National were sold with only minor variations (figure 6). They were adorned with various finishes, trademarks and decorations. Finishes ranged from the classic black to chrome, blue, gold, green and gray. The Pelouze trademark also changed over time from a patriotic Eagle and Flag version to a more modern simple stylized oval (figure 7).

The Star and the Crescent both are small nicely decorated letter scales suitable for use on a writing table or desk. They were manufactured with both open and closed sides and weighed letters up to eight ounces. Both were very popular models that could be found in many homes during the first twenty-five years of the last century (figure 8).

The Columbian, Union and National models were larger and were probably designed to satisfy the needs of offices and small businesses (figure 9). The Columbian weighed postal material up to two pounds, the Union up to two and one half pounds and the National up to four pounds. Although the weighing principle remained the same other elements of the scales did change. The shape of the based moved from a sculptured style to a cleaner square shape. The size of the arced face was made larger to incorporate postal rates by zone. As well there were changes required to accommodate the regular increases in postal rates.

Figure 14 ≺≺

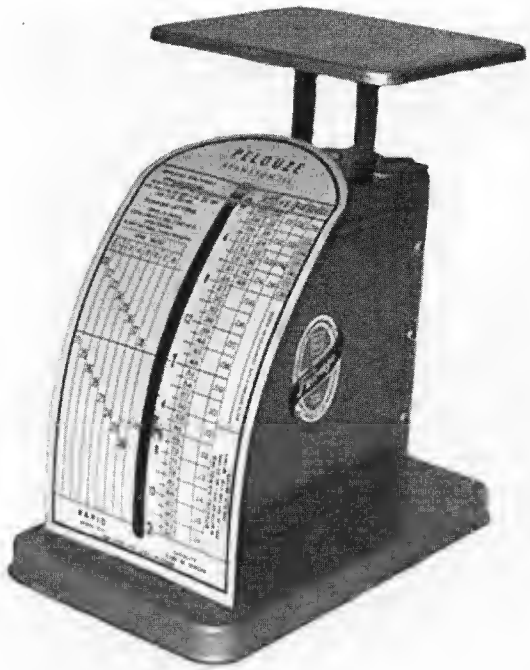
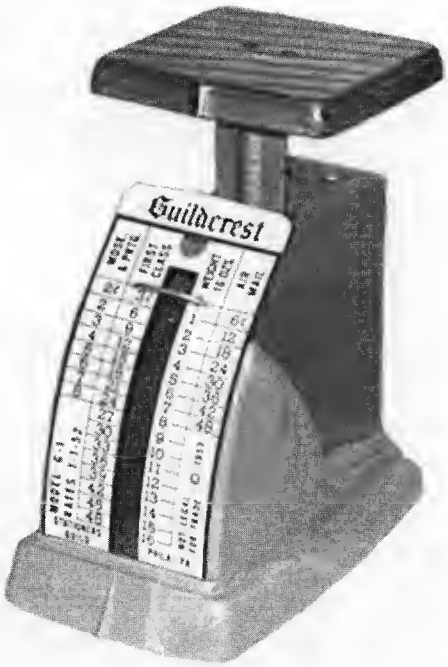


Figure 15 ≻≻



As referenced in Jerry Katz's article 'Birds of a Feather' in EQM 2001 Issue No. 1, Pelouze bow fronts were used by other firms that offered more ornate scale bodies. Among them are firms such as Gorham, Tiffany Studios, Heintz Art Metal Workshop, Jennings Bros. and Apollo Studios. Selection of these scales by these firms was a testament to the utility and quality of Pelouze Scale & MFG. CO.

The Columbian was also used as an advertising vehicle for a number of businesses. The 'Kenwood Felts and Jackets' scale Commissioned by F. C. Huyck & Sons of Albany N.Y. (figure 10) and the 'St. Charles Postal Scale' commissioned by the St. Charles Evaporated Cream Co. (figure 11) are examples of this application. The only reference to Pelouze on these scales is the Pelouze trademark and patent declaration stamped into the back of the scale.

Figure 16 ⩛⩛

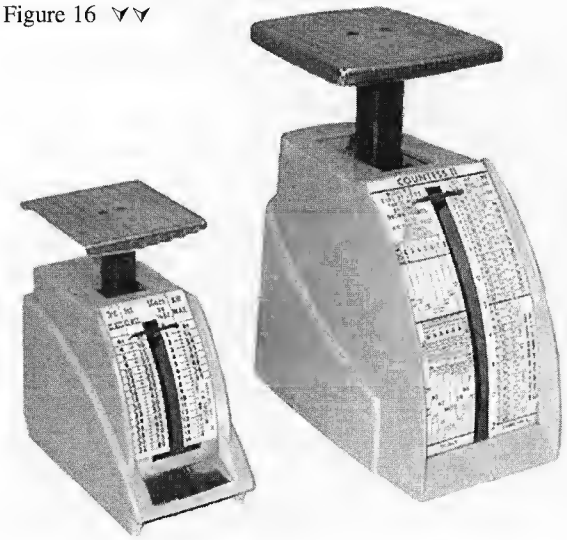
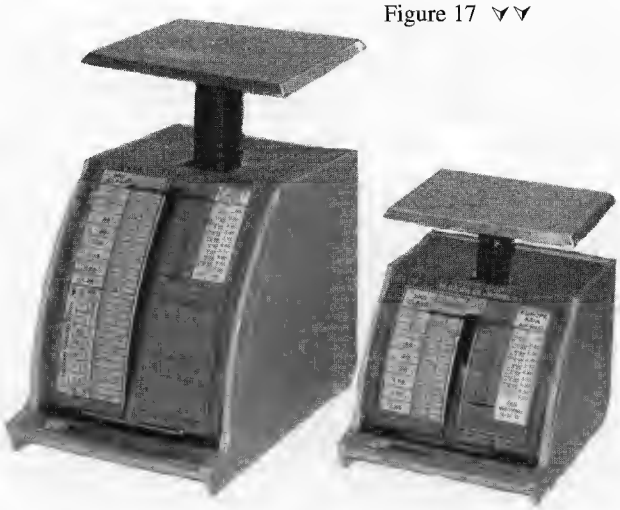


Figure 17 ⩛⩛



Another variation of the Columbian is the dual-purpose postal and confectionary scale, which is identical to the standard Columbian postal scale except for the scoop and its cradle, which replace the letter plate (figure 12)

During the 1950s The Pelouze Company offered a newer range of bow front postal scales, among them were the 'Princess' model M-1 (figure 13) and the 'Rapid' model N-2 (figure 14). The Princess replaced the Crescent and the Rapid replaced the Columbian and Union. For the first time we see the use of plastic as part of the scale body. There were several iterations of these scales as they were updated to accommodate postal rate increases. A scale identical to the Princess, model G-1 the 'Guildcrest' (figure 15) was produced for Stationers Guild of Philadelphia PA.

In 1965 the Princess and the Rapid are replaced by two new models the Petite model P-1 and the Countess Model P-2. The bodies of both are made entirely of plastic (figure 16).

In the 1980s two new bow front models were introduced simply called the X-1 and X-2 (figure 17). As with scales before them, changes were required for changing postal rates. From time to time Pelouze has provided rate change transfers that can be applied to the face of their scales. These two models are still available today and can be purchased at any office supply store.

Well back to the question of patents. The Pelouze Company has registered many more patents than the mentioned earlier in this article. As well they were diligent and often had their patents registered in many jurisdictions as can be seen on the base of an early Star Postal Scale (figure 18). In this case the three patents referenced were registered in The United States, Canada, England, France, Belgium and Germany. As we said earlier there were several other scale manufacturers that made bow front postal scales. Of note The I. D. L. MFG. & SALES CORP. of New York, The Marvel Scale Company of Milwaukee and The Kingsbury Manufacturing CO. of Keene New Hampshire are three companies that produced thousands of bow front scales. I can only assume that they did so under license or with the permission of the Pelouze Scale & MFG. CO. the owner of the bow front patents.

Figure 18 ≺≺ Gilfillan was issued British patent No.12,010, on 3 Oct.1896.

In 1908 you could buy a Crescent scale for $1.34 today you can buy the X-1 for $18.99. That's amazing 110 years have passed and substantially the same scale is widely available and in use throughout North America. What an illustrious history for such a simple device. Good going Pelouze!! You have demonstrated that your products stand up to the test of time.

In writing this article I have made a number of assumptions as a result it might not present a historically correct accounting of the evolution of The Pelouze Bow Front Postal Scale. I apologize for any major misrepresentations.

Inspecting and Collecting

BY J KNIGHTS

The first time I walked into the Weights & Measures office at Louth, I knew it was the place for me.

I was 16 and had left school with little idea of what I wanted to do. One possibility that presented itself was to go and work for a local firm of Auctioneers, which sounded quite interesting.

Given the lofty heights of stardom now achieved by certain people in that business (along with practitioners of cooking, gardening and wallpapering) it might have been a very good choice in retrospect. Given however my total lack of stage or television presence (the word 'charisn'tma could have been coined specifically for me, if it had actually been coined that is) I should doubtless have spent my career down in the basement heaving chiffoniers about rather than pontificating on the Antiques Roadshow.

As things transpired, another opportunity arose to join the County Council in its Weights & Measures Department; which my father thought sounded suitably worthy, even if he was slightly hazy about what it actually involved.

I did join, and immediately fell in love with the slightly archaic (even in the 1960s) atmosphere and the collection of what one less sensitive soul called 'Victorian lash-ups' but which was more commonly referred to as equipment.

The brass beams, bronze weights and cavernous gunmetal measures may have been ancient (circa 1858) but, at the time, were still the best tools for the job. It was not until the 1980s that electronics and austenitic stainless steel cut a sleek, but soulless swathe through the long established order.

Thus I stuck with the job, long past my initial trial period and eventually got to enjoy the relative security of public sector employment, with the bonus of getting to swan around the County and annoying people on their own premises.

I worked through a time of great change when Weights & Measures Inspectors turned into Trading Standards Officers, charged with the enforcement of a whole host of fair trading laws.

All the time I have spent in dealing with food law, credit statutes and product safety etc, I have never lost my interest in weights & measures, which I see as one of those fabric of society institutions like currency, with which it is intimately, allied and which allow the wheels of civilisation to turn.

Though I had always admired the beauty and function of the equipment I encountered every day, it only occurred to me to collect it when I realised it was disappearing from use.

I now collect all manner of W&M related material in an unfocussed and eclectic manner. I am fortunate to have a very understanding wife, Ann, who scarcely bats an eyelid (outwardly at least) when the most lumpen of galvanised or stove enamelled monstrosities is hauled in through the door.

If I have a favourite area it must be measures of capacity (shock horror), especially ceramic pub measures (which is slightly odd for a teetotaller) and dry measures. Dry measure is a system all but abandoned in UK (I can only think of garden compost, shrimps and shellfish and fishermen's maggots that are routinely traded this way today) so these bent-wood, coopered oak, metal and willow woven artefacts emit a peculiarly plangent ring of the vanished past.They are also items that are often beautifully crafted and represent a perfect fusion of wood and iron.

I currently work in the fabulously unfashionable town of Scunthorpe, which is routinely used to epitomise the grim and ghastly character of industrial Britain. So synonymous is it with this image that some people even believe it is a fictional place from a gritty Northern novel of the 19th century. It did actually feature as the setting of the novel that inspired the 1970s film 'Get Carter'. It was however, presumably, considered box office poison as a film location so they reset it in Newcastle. Michael Caine therefore met his end on the Northumbrian coast instead of the bank of the Humber and Newcastle has been living off the fame ever since.

I'm pleased to say I can still see the four great blast furnaces from my office, belching forth their admittedly polluting fumes as the alchemy that turns brittle earth to iron takes place within.

Everyone in the town realises that their days are numbered as we continue to farm out our basic processes to places far away and cheaper; and that one day these symbols of past glories will grow cold and be swept away.

So it was with our scales and weights, supplanted by new technologies and cast on the scrap heap. Fortunately a few of us have managed to intervene and save one or two of the choicer items for posterity. I am renowned for taking in one or two unfeasibly large items into my motley collection but I guess I'd have to draw the line at a blast furnace.

Accessing U.S. Patents

BY J H BERNING

The first step to accessing U.S. Patents is to download the viewer to enable you to see the patent images. Connect to the internet using Netscape or Internet Explorer. (Mac users can view the images using Quicktime 4.1 or later.) Go to http://www.internetiff.com/InterneTIFF/Try.htm. Click the appropriate link, based on your browser, for a free download of interneTIFF. This should take approximately 8 minutes on a 56K modem.

Go to www.USPTO.gov. On the left side of the page is the word Patents and below that the words File, Status, and Search. Click on: Search. This will take you to a new page. In the green rectangle on the left side of this page you will find the words: 1. **Quick Search** (This is a Boolean search for searching two different criteria at once.) 2. **Advanced Search** (Will allow searches for numerous criteria one at a time.) 3. **Patent Number Search** (Will allow searches only for one patent number at a time. You must know the patent number to use this search.)

In order to search for scales, most of which are listed in classification 177, you must use the "**Advanced Search**" link. With your cursor in the empty box, marked **Query**, on this page, type in: ccl/177/$ and change the "**Select Year**" box to "1790 to present [entire database]." Click on the button marked "**Search**." This will display a data base of almost 15,000 patent numbers, most for scales.

The later or newest patents are displayed first and the earliest ones will be at the end of the list. You can move to any page in the database by putting a number in the box marked "Jump To" and clicking the button. As an example typing 14,000 in the Jump box will take you to a page with patents from 1883. Clicking on any Pat. No, will take you to a page with several red bordered buttons. Clicking on the button marked "**Images**" will give you the first page of the patent. To move to subsequent pages of the patent: click on the arrow buttons at the top or left side of the patent image. To print the patent page: use the print button at the top of the patent image.

Note: The web site changes sometimes so that these directions may change from time to time.

The Variety Works Scale, an American Puzzle

BY S BEARE

Figure 1 ⅄⅄ Variety Works Scale, Lancaster PA.

While attending an outdoor antique show in the fall of 2003, I was thrilled to find an unusual 19th century counter steelyard scale (Figure 1). The anvil-shaped end of the movable poise fits securely in the slots on the beam to adjust the weight in one-pound increments from one pound to seven pounds (Figures 2 and 3). The tab on top of the one pound, 2 ounce poise is a finger grip, and two drilled lead-filled holes in the bottom of the poise are for calibration (Figures 4 and 5). There is also a lidded weight container on the end of the beam for adjustment (Figure 6). The total capacity including the small sliding poise on the notched side beam is 8 pounds, and the overall length is 16". The scale has the original black paint, and there are traces of gold paint on the raised numbers. The cast iron base is marked No. 5, implying there may have been other models, and the notched brass side beam is stamped with a most intriguing, but unfamiliar name: **Variety Works Lancaster, PA Pat. App'd For** (Figures 7 and 8).

During the course of inspection, I observed six unusual short file marks on the bottom of the poise (Figures 5 and 9A). Upon scale disassembly and thorough examination, I found four other parts of the scale have similar hidden identifications. (Figures 9B-E). Of the five identified pieces, four have two groups of three uniformly spaced short file marks. In the case of the underside of the beam (Figure 9B), the file marks were made before it was painted, and in all other cases the marked area was never painted. When the brass side beam is removed, two rows of three dimples are revealed (Figure 9E).

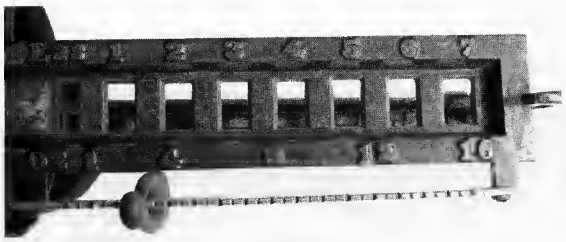


Figure 2 ⅄⅄ Slotted beam detail.

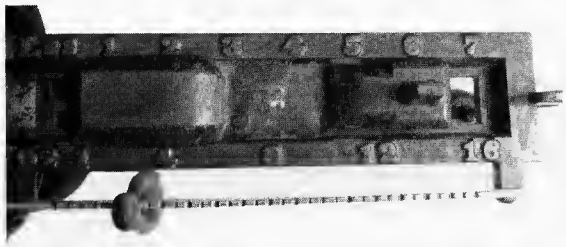


Figure 3 ⅄⅄ Slotted beam and poise detail. The poise is inserted into the 6 pound position.

It is common for early scientific instruments to have screws and corresponding screw holes marked with a series of dimples to ensure proper mating of individually cut threads, and many brass balances have parts stamped with an identification number or a series of dimples, e.g. stirrups and beams on analytical balances. However, it is uncommon for cast iron scales to be so obviously identified in a way to ensure that all pieces be

Figure 4 ⅄⅄ Poise side view. The rarety of this scale may be due in part to the fact that the poise is a separate entity which could easily be misplaced.

Figure 5 ⅄⅄ Poise bottom view. This shows the anvil shaped point of the poise that fits into the rectangular holes on the beam.

kept together during final assembly. A simple code would be to have the first thrcc marks represent 3x5, the second three marks represent 3x1, and this would then be scale number 18. Confirmation of the actual code will have to await examination of other examples of this scale or other similarly marked scales.

In trying to identify who made this most intriguing scale, I searched the U.S. Patent listings up to 1882 published in EQM at the time.[1] I located no Variety Works or Lancaster scale makers, so I checked out all Pennsylvania patentees, but could not find anyone who looked like the likely inventor. I concluded that a patent may not have been issued for this scale, and it may not even have been applied for.

Without a patent number or date, the U.S. Patent Office database does not readily give up its secrets. However, when I sent Jan Berning photographs of my scale at Diana Crawforth-Hitchens' suggestion, Jan immediately located Patent No. 277,878 of May 22, 1883, by Dennis Buoy of Lancaster, Pennsylvania (Figure 10). This information was for an EQM patent article not yet published at the time, and that key patent started an intensive search for more information about Dennis Buoy.

I again reviewed the EQM patent database, and found Buoy was earlier granted a patent for a counter ball scale, Patent No. 99,148 of January 25, 1870 (Figure 11). It is not known if this interesting scale was ever manufactured. It used balls of four different sizes, any one of which could be easily lost, and was relatively complicated to use. Troemner's later popular ball scales using a single diameter ball may have been based on a simplification of Buoy's four-ball scale.[2] Surprisingly, the 1870 patent gives Buoy's address as Danville, Pennsylvania, located around 80 miles northwest of Lancaster.

Figure 6 ⅄⅄ Beam adjustment compartment. Lead shot can be added to the chamber in order to balance the scale.

Figure 7 ⅄⅄ Base model identification.

Figure 8 ⅄⅄ Beam name mark reading Variety Works Lancaster, Pa Pat App'd For.

Figure 9A ⅄⅄ Poise file marks.

To help locate the elusive Buoy, I enlisted the help of two commercial online databases, which allow one to search most of the 19th- and early 20th-century 10-year Federal censuses by family name.[3] Of greatest interest are the censuses of 1850 and later, because these show occupations, names and ages of family members, their country or state of birth, as well as the birth place of parents, which all helps to pinpoint if one has the right person. Through this means, I was able to locate several Dennis Buoys as farmers and clerks in central Pennsylvania, but none looked like potential scale inventors. I also came up empty handed on any Dennis Buoys located in Danville or Lancaster.

I then tried another approach. The 1870 patent has two witnesses, E.W. Conkling and Chas. C. Long, who presumably witnessed Dennis Buoy signing the application when it was filed on December 8, 1868, when he lived in Danville. I presumed that Conkling and Long were upstanding citizens of Danville. By searching the Internet, I was able to find that E.W. Conkling was born in New Jersey in 1819, and at the age of sixteen went to Princeton College, from which he graduated in 1838. He taught at the Danville Academy for seven years, and moved back to New Jersey and taught school there for two years. He returned to Danville, where he was county superintendent of public schools of Montour County until 1849. He then embarked in the book and stationary business in Danville, which he continued until at least 1887.[4] The fact that Conkling was a well-established businessman in Danville in 1868 suggested a connection with Buoy and possibly Long. I next checked the census records and located E.W. Conkling, age 50, Retail Merchant & Express Agent, in the Danville census for 1870.[5] However, I was not able to find either Charles Long or Dennis Buoy in 1870 in Danville by searching the name index. I then laboriously went through all the microfilm images for Danville for 1870, and finally found Dennis Bowy, age 52, Retail Store Clerk, born in Pennsylvania, and living alone in a hotel. His Personal Estate was valued at $600.[6] Is it possible that Dennis Bowy is the scale inventor Dennis Buoy, and he might even have worked for Conkling in Danville as a clerk in the stationary/Express Agent business?

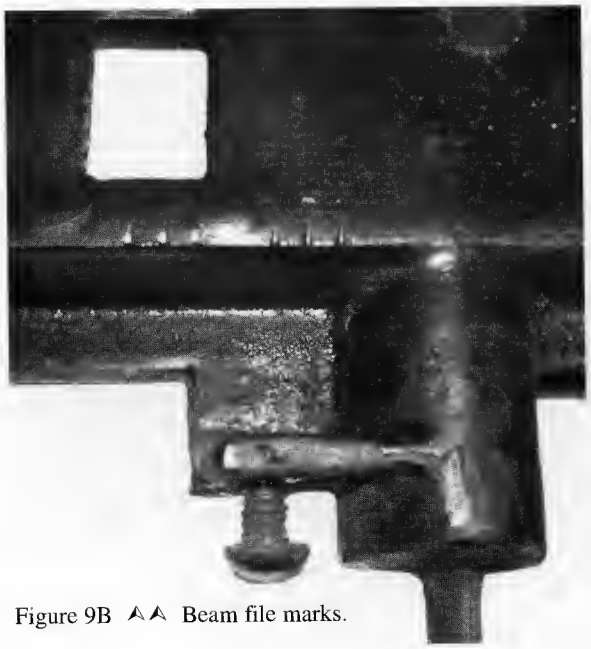


Figure 9B ⅄⅄ Beam file marks.

I then tried searching the census index for Dennis Buoy using obvious spelling variants, with no success. In a desperate but lucky move, it occurred to me to try the 1880 census using Dennis's first name and no last name. Using an estimated age range to narrow the list

Figure 9 C ⩛⩛ Beam file marks.

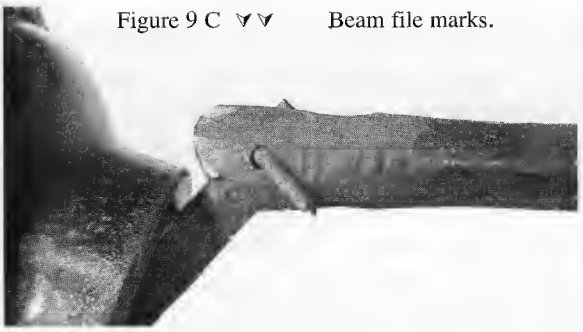


Figure 9 D ⩛⩛ Yoke file marks.

of ~2800 Dennis's in Pennsylvania to a manageable number, I found an attractive candidate. To my surprise, he was located in Philadelphia, not in Lancaster. He was listed as Dennis Bookey, age 62, widower and boarder, and his occupation was **Works at Scale Factory**.[7] Bookey could have simply been an employee of one of the scale factories in Philadelphia, like that of Henry Troemner, John Dell, Edward Hoffman, or the Riehle Brothers (also known as the Philadelphia Scale Works). However, the unusual name seemed a promising misspelling of the inventor of my scale. A visit to Hagley Library to go through the Philadelphia Directories yielded no Bookey or Buoy in 1880. I then searched the annual Directories up through 1890 and then back through the 1870s. To my delight and surprise, I found Dennis Buoy of *Buoy, Brenner & Co.* in the 1873 Directory, along with another unexpected name, William H. Buoy, both living at the Eagle Hotel. When I checked the directory listing for *Buoy, Brenner & Co.*, I finally found the scale connection. The owners are listed as Dennis Buoy, Joseph C. Brenner, Jacob Kohler, and William H. Buoy, and the business is described as **Scale Manufacturers**, located at 120 Exchange Place & 122 Arch. The individual listings for Brenner and Kohler simply reference *Buoy, Brenner, & Co.* The Buoys also appeared in the 1872 Directory at the Eagle Hotel, and *Buoy, Brenner, & Co.* existed from 1872-1874.[8]

It was now established that Dennis and William H. Buoy had a short-lived scale manufacturing business in Philadelphia from 1872 to 1874, perhaps to manufacture the ball scale patented in 1870. However, this is too early for my Variety Works scale, whose patent was applied for in 1880, and by its name it would appear to have been made in Lancaster and not Philadelphia. Other useful pieces of information from the 1880 Census are that Dennis was born around 1818, was a widower, his father was born in Ireland, and that he lived as a boarder in Philadelphia on the East side of Ninth Street. However, I was not able to locate him in the Philadelphia directories after 1874, so it is not likely he spent much time there. Was William H. Buoy his brother, father, or son?

Armed with his approximate birth year of 1818 and looking for a William Buoy connection, I rechecked the census records for all prospective Dennis Buoys in Pennsylvania and found the right person through the "fingerprint" of his family. The 1860 Census lists Dennis Buoy, age 39, living in Northumberland County, Zerbe Township, PA, with wife Ann, age 34, and six children: son **William**, age 15, Emma, age 12, Mary, age 10, Margaret, age 9, James, age 5, and Sarah, age 3.9. Dennis's

Figure 9 E ⅄⅄ Side beam dimples.

occupation was Clerk, typically a low-paying job; the value of his personal property was only $200, a meager amount for such a large family. The only town in Zerbe Township was the small town of Trevorton, listed as Buoy's Post Office in the Census.[10]

By Dec. 8, 1868, when Dennis applied for his first scale patent, his home was in Danville, located only 15 miles north of Trevorton on the Susquehanna River. Two years later, by the 1870 census, Dennis Bowy (sic) age 52, was living in a hotel by himself in Danville and still working as a clerk.[6] The 1870 Census also finds five of the six Buoy children (including William, age 24, now a Merchant Clerk) living in Chillisquaque, Northumberland County, in the household of Daniel Caul, a farm laborer.[11] It appears that Dennis's wife Ann died between the Censuses of 1860 and 1870, as Dennis's unmarried sister Bridget, age 40, is now recorded as keeping house. We further find from earlier censuses that Daniel Caul, single and living with his older sister, was the neighbor of Dennis Buoy's father, also named Dennis, who can be traced back to 1810 as an Irish-born farmer in Chillisquaque. This small town is located only 15 miles west of Danville on the west branch of the Susquehanna River.

In the 1850 Census, the first to give family member names, ages and specific occupations, we find that the elder Dennis Buoy was 63, and married to Leah, age 62.[12] His Real Estate was listed at $3000, a respectable amount, indicating he was a successful farmer. Among three daughters living at home was Bridget, age 20, the same Bridget who later in 1870 took care of scale inventor Dennis's motherless children while he was working as a clerk in Danville while patenting his ball scale.[13] Then, for a short time from 1872 to 1874, Dennis and son William H. are in Philadelphia at least part of the time engaged in a scale business with two other partners. Finally, Dennis pops up in the Philadelphia census in 1880 working in a scale factory, and his Variety Works scale patent application places him in Lancaster when it was first filed on May 14, 1881.

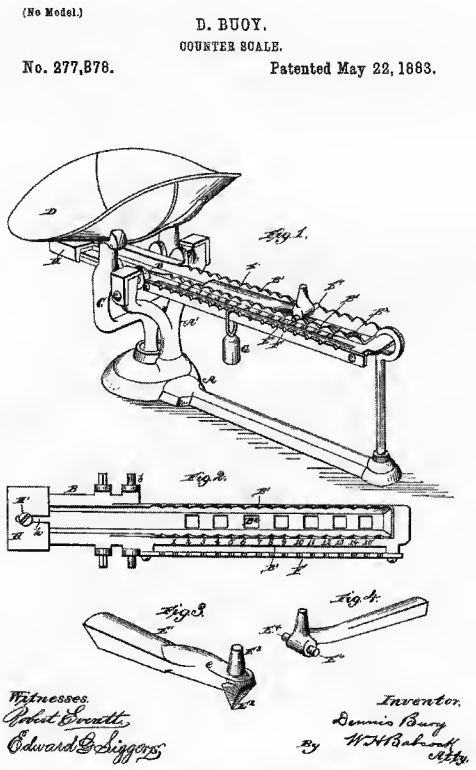
That suggested the 1883 Counter Scale patent might provide additional clues to the peripatetic Buoy. I checked out the patent witnesses John K. Stoner and J.N. Stauffer in the 1880 Federal Census for Lancaster, and located John K. Stoner, age 47, Hardware Dealer, on North Queen Street, and John N. Stauffer, age 35, Dealer in Hardware, on North Duke Street.[14] I also located Dennis's son, William H. Buoy, age 32, in Lancaster in the 1880 Census at 322 East Orange Street as a Pattern Maker. He was married to Mary, age 25, with one small child, William C., age 2.[15] Since William H. Buoy lived and worked in Lancaster in 1880, it seems reasonable that Stoner and Stauffer were business acquaintances of William. Dennis would have known them too, but must not have been in Lancaster during the June 2, 1880 Census, but was there by the following year.

The 1890 Census records were nearly all destroyed in a fire, and the 1900 census finds son William H. Buoy in Lancaster on Lancaster Avenue, working as a metal pattern maker.[16] With so little to tie Dennis Buoy to Lancaster other than the single reference in the patent application, and the fact that his son lived there between 1880 and 1900, I felt a trip to the Lancaster Historical Society might be fruitful. Indeed it was, for there I found in the 1882 Lancaster City Directory a listing for Dennis Buoy, scale maker, boarder at 322 East Orange, followed by a listing for William H. Buoy, patternmaker, with his home at 322 East Orange. This finally confirmed my belief that Dennis Buoy was living in Lancaster with his son and his family.

Dennis Buoy does not appear in any of the other available Lancaster directories before or after the single appearance in 1882.[17] William H. Buoy first appears in the Lancaster directories in 1882, but is absent in 1884. He does not reappear until 1888, still listed as a patternmaker, but now living at 329 North Mary. He is at this same address and occupation until 1894, and is then listed at 329 Lancaster Avenue as a patternmaker in 1896 and 1897.[17]

I next found that John K. Stoner was in partnership with John N. Stauffer and Isaac Shreiner in a successful Lancaster hardware store on North Queen Street (Stoner, Shreiner & Co.) in the 1880-1900 period. This firmly connects the two 1883 Variety Scale patent application witnesses, Stoner and Stauffer, to each other as well as to Lancaster.

When the Lancaster County Historical Society Librarian suggested it might be possible to locate the Buoys in the manuscript tax records, I eagerly jumped at the opportunity. These records are arranged alphabetically by Property Owners, Tenants, and Single Males within each tax year for each Ward in Lancaster. To my delight, I found William H. Buoy listed as a Tenant in a home owned by a tailor at 332 E. Orange with the occupation of **Scale Maker** in 1880 and 1881, Laborer in 1882 and 1883, and Patternmaker in 1884.[18] He next appeared at 329 Mary Street in 1888 as a Laborer, then in 1889 through 1893 as Patternmaker.[19] Even more exciting, however, was to locate Dennis Buoy in the listings for Single Males. He lived with his son William C. at 322 Orange, and his occupation was **Scale Maker** from 1880 through 1883.[18] He does not appear in the tax records after 1883.[20]


(No Model.)

D. BUOY.

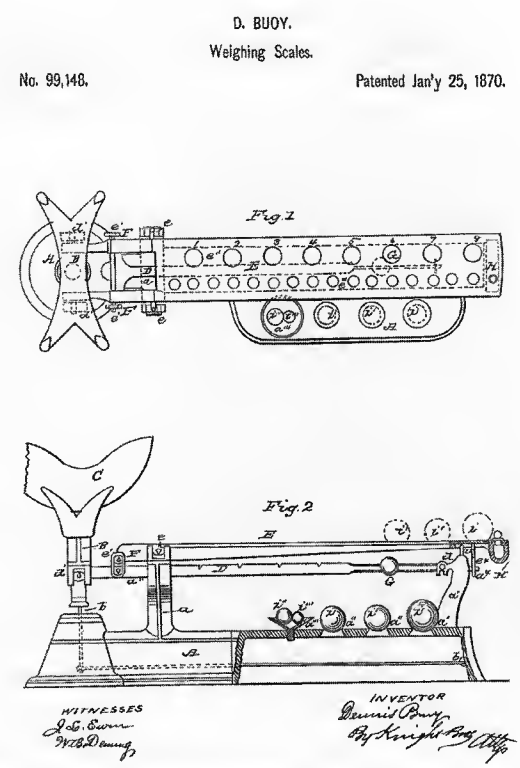
COUNTER SCALE.

No. 277,878. Patented May 22, 1883.

Witnesses.
Robert Everett
Edward B. Siggers

Inventor.
Dennis Buoy
By W. H. Buoy Atty.

Figure 10 ⩓⩓ Buoy patent no. 277878, May 22, 1883.


D. BUOY.

Weighing Scales.

No. 99,148. Patented Jan'y 25, 1870.

Witnesses
J. G. Ewen
W. B. Deming

Inventor
Dennis Buoy
By Knight Bros Attys

Figure 11 ⩓⩓ Buoy patent no. 99148, January 25, 1870.

With the richer details provided by the tax records, a much clearer picture emerges. Dennis Buoy was boarding with his recently married son William C. in Lancaster from 1880 until 1883, and both of their occupations were scale makers during that period. This is also the period during which the Variety Works scale, for which a patent was applied for in 1881 and was issued in 1883, would have been manufactured. Because father and son were living together in Lancaster, the Variety Works scale most likely was manufactured in Lancaster, but it could also have been contracted out to a scale factory in Reading or Philadelphia.

How Dennis Buoy became a scale maker is still a mystery. He was raised on a farm, became a clerk, supported a large family on a clerk's wages, was widowed at a relatively young age with five children, and had to separate from his family to find work. Still, he found time to learn the mechanical and business skills needed to design, patent, and manufacture two relatively complicated scales, partnering with his son and two other men in Philadelphia in the early 1870s, and then again with his son in Lancaster in the early 1880s.

With a bit of luck and much perseverance, one can find a surprising amount of information using Patents, City Directories, Census information, and Tax Records, gathering seemingly isolated bits of information, and using an iterative process to continuously refine and slowly connect the dots. Judging from the large numbers of scale patents issued to individuals in the U. S. in the 19th century, there must be many amateur American scale inventors like Dennis Buoy who struggled to survive as clerks, machinists, carpenters, or some unrelated occupation. It is our obligation as temporary stewards of these artifacts to unmask these unheralded inventors wherever possible.

Acknowledgements

The author would like to acknowledge Diana Crawforth-Hitchens and Ruth Willard for initiating the EQM Patent database, and Jan Berning for extending the database and discovering the Variety Works patent. In addition, unrestricted access to the Philadelphia City Directory resources of the Hagley Library is gratefully acknowledged. Finally, the invaluable help of Marge Bardeen of the Lancaster County Historical Society to locate original Buoy tax records is deeply appreciated.

Notes and References

1. Equilibrium, 2637-2639, 2663-2671, 2696-2700, 2726-2728, 2747-2755, 2779-2784, 2808- 2811, 2842-2844, 2869-2871 etc

2. See Equilibrium, 1721, for a twentieth century example. No ball scales are shown in Troemner's 1883 catalog (Price List of Steel Pivot & Steel Bearing Scales Made by Henry Troemner, Philadelphia, Jan. 1, 1883). However, by 1899, Troemner advertised three different ball scales, at least one of which dates to 1892 (Price List of Fine Scales and Weights Made by Henry Troemner, Philadelphia, April, 1899. On page 15 is an enthusiastic letter of endorsement for Troemner's new ball scale from Ellis Pugh, Adjuster of Weights and Balances, U. S. Mint, dated October 31, 1892). By 1926, Troemner advertised eight different models of ball scales, as further evidence of their popularity (No. 1926. Catalogue of Scales and Weights for Grocers, Confectioners, Bakers and General Market Uses, Made by Henry Troemner, Philadelphia, 1926).

3. The databases I used are ancestry.com and geneology.com. Despite claims of over two billion names, both databases are far from complete, and are still works in progress. However, between the two databases, one can cover around two-thirds of the available microfilm records of the 19th century for the entire Unites States, which is not practical otherwise. The main weakness of database searches over viewing microfilms is that name spellings are inconsistent and often incorrect in the censuses, and it is easy to miss a person because of either misspelling by the census takers, illegible penmanship, or typographical errors by the indexers.

4. History of Columbia and Montour Counties, Pennsylvania, Edited by J. H. Battle, 1887, Danville, page 148.

5. 1870 Federal Census, Pennsylvania, Montour County, Danville, 1st Ward, page 82.

6. 1870 Federal Census, Pennsylvania, Montour County, Danville, 1st Ward, page 90B.

7. 1880 Federal Census, Pennsylvania, Philadelphia County, Philadelphia, Enumeration District 225, page 356D.

8. There are no references to the Buoys in the 1871 Philadelphia Directory. The 1872 Philadelphia Directory simply lists Dennis Buoy and William Buoy, Eagle Hotel, and the listings for Brenner and Kohler refer to the business Buoy, Brenner, & Co. In 1874, only the Brenner listing refers to Buoy, Brenner, & Co. By 1875, Brenner had formed a new stationers business, J.C. Brenner & Co. Brenner remained in the stationers business until 1888. Kohler is listed in only the 1872 and 1873 Directories in connection with Buoy, Brenner & Co.

9. 1860 Federal census, Pennsylvania, Northumberland County, Zerbe Township, page 712. Buoy's recorded age of 39 is incorrect, as he was actually 41 or 42 at the time; it is not unusual for ages to be wrong in the censuses.

10. Zerbe Township was formed in 1853, and it had a population of only 1,432 by 1860. The town of Trevorton was formed in this coal mining community in 1850, and its population was only a few hundred by 1860.

11. 1870 Federal Census, Pennsylvania, Northumberland County, Chillisquaque, page 21.

12. 1850 Federal Census, Pennsylvania, Northumberland County, Chillisquaque, page 206.

13. Danville had a population of 8,400 in 1870, largely associated with a flourishing iron ore industry, while Chillisquaque was only a small town of 1,597 and Trevorton was even smaller. The necessity of supporting his large, motherless family on a clerk's wages could explain why Dennis was living 15 miles away from his family.

14. 1880 Federal Census, Pennsylvania, Lancaster County, Lancaster, 1st Ward, pages 4C (Stoner); 6th Ward, page 138A (Stauffer).

15. 1880 Federal Census, Pennsylvania, Lancaster County, Lancaster, 2nd Ward, page 24D.

16. 1900 Federal Census, Pennsylvania, Lancaster County, Lancaster, 9th Ward, page 328A. The 1900 Census further reveals William's birth date, December 6, 1844, and the fact that he has been married to Mary, age 46, for 23 years, i.e. since 1877. Of nine of William H. and Mary Buoy's born children, only five are still living in 1900, and four are at home ranging in age from 3 to 16. The decade 1910 sadly finds William H. in Philadelphia in a Home for the Aged run by the Little Sisters of the Poor, and his son James E. has moved to Springfield, Illinois, working as a jeweler (1910 Federal Census, Sangamon County, Springfield). By 1920, William H. has died, and his widow, Mary, now 65, has also moved to Springfield to live with her three grown unmarried daughters (1920 Federal Census, Sangamon County, Springfield).

17. See Lancaster City Directories for 1876, 1878, 1881, 1884, 1886, 1888, 1890, 1892, 1894, 1896, and 1897.

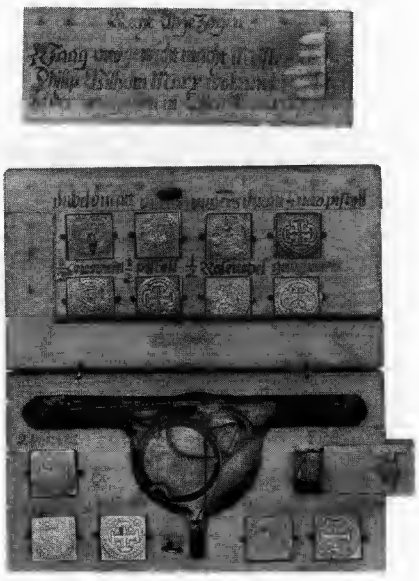
18. Tax Roll Records, Lancaster County, Lancaster City, 2nd Ward, 1868-1885, Lancaster Historical Society.

19. Tax Roll Records, Lancaster County, Lancaster City, 9th Ward, 1885-1893, Lancaster Historical Society.

20. As he would have been 65 years old in 1883, Dennis Buoy may have retired, moved, or more likely, died before the 1884 tax poll was recorded.

Review

Bilance e Strumenti per Pesare le Monete (Metà XVII-XX secolo) di una Collezione Privata, by Guido Zavattoni. [Scales and Instruments for weighing money, from the 17th-20th century, from a private collection.] Produced under the patronage of the Museo della Bilancia di Campogalliano and the Società Cooperativa Bilanciai. 22 introductory pages + 312 catalogue pages, A4 hard-back, 210 illustrations of individual scales, 1 graph, 25 additional illustrations of parts of scale-boxes. Euro 80 plus packing and postage. ISBN 88-87235-25-2. Available from Edizioni Ennerre S.r.l., Via S. Rocco 8, 20135 Milano, Italy. Fax (+39) 02 58 30 91 85. Internet - www.edizioniennerre.it. Email - info@edizioniennerre.it



A Cologne scale dated 1727, made by Philip Wilhelm Marx, very few of whose scales survive. The weights are held securely in the box by the sliding lid, shown above the box. The use of a triangular pan died out by the middle of the 18th century.

This almost unused Milanese scale was probably made by Andrea Sangiusto, balance maker to the Mint in 1765. Note the fine design and good fit for every part in both drawers.

English speakers, do not be dismayed. This book is written by ISASC member Guido Zavattoni who speaks fluent English and has targeted the book primarily at Italian speakers, but additionally at English speakers. He gives a brief but excellent résumé in English at the beginning, and the main text is catalogued for each and every scale under identical headings - Catalogue number, Country, Period, Maker, Box shape, Fastening, Dimensions, Material of box, Beam design, Printing/hand-writing, Weights, Fractional weights, Notes/Comments, Reference to end-notes. The details are in Italian, but in very simple Italian that anybody can quickly master using a dictionary. Some of the Notes are a bit more complicated, but, by going onto the www, and using the AltaVista translation service (free of charge), any problems are immediately sorted out.

Guido has assumed that we can use our eyes on the superb illustrations, and use his summary and English glossary to help us through. Knowing how many Americans lack dictionaries, I think Guido could have justified the inclusion of more words in his glossary, but that is a very minor quibble.

No collection is formed with the intention of teaching readers! It is collected because the objects please the collector, because he had the opportunity to buy, because the price was not exorbitant, because the object is clean and complete, because he has never seen one before ... But a side-effect of publishing such a comprehensive catalogue is to teach the reader. The résumé at the beginning is especially helpful in giving an over-view of European coin scale production, and the reviewer learned a lot.

As is normal, the owner has collected more anonymous scales than named ones. This triggers the usual questions. Can we be sure of the source? Sure of the date? Can we identify the period of use? Are we seeing scales that are very unusual? Or are they common types? Two or three seemed oddly categorised, but the vast majority were obviously correctly described, and one can have every confidence in Guido's scholarship.

This Turin scale is typical in not bearing the name of the maker, but merely having the information label giving the weight and value of each coin. Note the huge number of coins that a Turin person might handle in the 19th century.

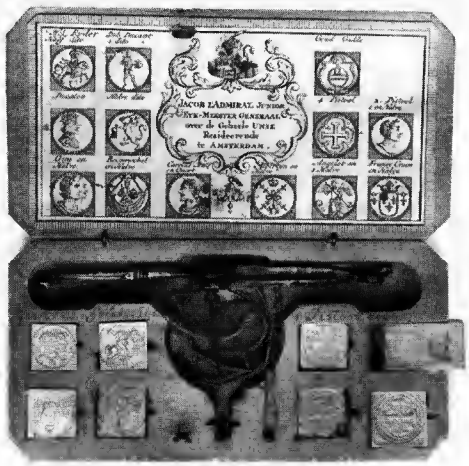
Because the collection covers over 400 years of production from 11 cultures, the idiosyncrasies of any one culture or nation can scarcely be deduced, but it is surprising how often a pattern emerges. The distinctions cannot be used reliably to identify scales in the readers' collection, but a very good attempt can be made. Any time spent matching characteristics of one's own boxes with those in the book is time well spent. For example, an anonymous Italian box containing 40 European weights was compared with the photographs. It didn't match the Milan boxes with their chamois-leather linings, brass beams and round coin-like weights. It didn't match the Genoa boxes with their crudely stamped square weights. The beam has a bulge below the fulcrum that did match the Turin scale-beams. It had a huge label listing the Tariffs for coins regulated in 1821, as did the Turin scale-boxes. It has the square weights neatly stamped, as did the Turin boxes. The exercise was very useful in clearing the mind and identifying various Italian features.

Admittedly, there are far more Italian examples than any other nations' examples, there being 55 of them. But American collectors have more gold-rush scales and more CCDs, the English may have more anonymous Birmingham scales, the Dutch have a preponderance of Low Countries scales. Opportunity must play a part in selection.

There is one Italian diamond balance included. How did that qualify? It is there to be compared with the previous box of coin weights, also by Antonio Damiani. A box clearly Labeled Laurens Grosset, and one clearly Labeled Jacques Blanc, is said to be by an unknown maker. How come? Guido defines "Maker" as the maker of the weights, so, if a marriage has occurred, these anomalies arise. Two rockers of the Fascist period (1920-1930) are new to the reviewer, with trade names Dux and Bimo.

Making best use of the Figures is a bit irritating. There are 21 Figures which show some aspect more clearly in close-up, a laudatory aim, but on page 114, the text and the main picture of the whole kit does not mention that, by going to page 148, you will see details. Every now and again, you find one of these figures, and you have to flip back until you find the details with the general picture! I suspect that Guido forgot this cross-reference, so helpful to the reader, because he was rushed at the end of production.

The Spanish section demonstrates clearly the great variety of styles copied by Spanish makers. One develops a great affection for a nation that never settles for one style. The pointed plywood box made by Farriols is a case in point, being a very odd shape. Close-ups of the amazing verification stamps would have been interesting. As so few Spanish makers operated, a complete list of known makers could have been included.



This superb Low Countries box, made in the second quarter of the 18th century, is unusual in stating that, although Jacob L'Admiral Junior was the Chief Weights and Measures Inspector for the whole Union of seven provinces, he lived in Amsterdam. The seven provinces used the symbol of a rampant lion swinging a sword, held within a fence. The weights are stacked in the holes. The poker, used to flick the weights out, is missing.

The UK section has a few omissions. Because so much has been published previously, dates of makers can be found in EQM with relative ease. The box shown on page 166 has distinct marks left by a set of nesting weights for silver coins. The crisp Walter Phillips set is probably the earliest known example of the use of shagreen for a scale box. The equally clean Richard Roberts set is unusual in having weights in pennyweights and grains, but not having any coin weights. So a little note at the bottom of each text would have been justified. And the Catherwood should have been printed in gold to point up its extreme rarity and peculiarity!! What a choice piece! The reviewer sighs!

The Low Countries examples must make Dutch and Belgian collectors equally entranced. The clarity of the labels by Peeter Herk, by J F Wolschot, and by J L'Admiral Junior is outstanding. The completeness of the sets of weights is amazing. It is interesting to compare the labels of Wolschot and Batist, so nearly identical, but the later example by Batist, has two pictures of coins replaced by others, suggesting a change in the circulation of gold coins during the 16 years' gap.

The German boxes point up the very different regional variations. The Cologne boxes are superb, the Nuremberg boxes are boring, the Berg & Mark families are the usual litany of Kruses, Poppenbergs and Mittelstenscheids and the Prussian ones lack interest.

Austria, Switzerland, the USA and Turkey appear briefly at the end, with a nice little surprise of five weights for dollars, one stamped "Dollari" so one assumes it originated in Italy. The Byzantine cruciform rocker has been dated at VII-X century, showing how ineffectual the term "Byzantine" is for dating purposes. Other scholars date these Byzantine rockers at around 14th-15th century. Those assuming that one needs only to weigh a few coins to determine the period of manufacture must take into account the fact that many gold coins of different periods have very similar weights and similar diameters, so making it very difficult to decide categorically which coins were to be weighed on the rocker.

The Bibliography is amusing in being arranged in chronological order of publication. Given as a general rule that the older the publication, the greater the chance of rubbish having been written, the arrangement has much going for it! The bibliography is followed by lists of journals consulted, auction catalogues used, abbreviations (that would have been more useful at the front), indices of places, masters, coins for which weights are shown (very useful), marks and initials. Northern Europeans will find this sequence very odd, but once mastered, perfectly useful.

It is a typical Italian book in that it has great areas of white space, but one can explain much of the space as being caused by Guido's rigid adherence to his methodical approach. But the natural consequence is that the wasted paper increases the weight of the book to an astonishing 3lb 10oz (1.7kilos). The text is not florid, mercifully, as in some Italian publications, and the author concentrates on coin scale boxes only - no meandering off to show sculptures or pretty girls - a great relief to the Northern European reader. The author has stuck to the facts, with virtually no conjectures, to the point where one almost wishes for a few generalisations about regional or national characteristics of coin scales! The illustrations are uniformly crisp, well-lit, and informative, the scales being mostly shown full-size and only reduced to page size where essential. As the book is only Euros 80, it must be considered an excellent use of money, and a thought-provoking and interesting book. If you collect coin scales, buy the book. D F C-H

American Grain Testing Scales

BY B JIBBEN

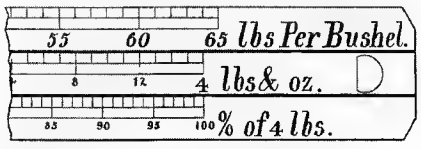
Grain scales have been produced by manufacturers from a number of countries[1]. The basic use of these scales is to determine the weight per bushel of various grains by taking a sample from a large amount of the grain. Grain that is lighter or heavier than the standard weight established for each grain may be caused by weather, inert materials, and other factors. The following are the basic weights for one bushel of some selected grains:

Wheat & Soy Beans	=	60 Pounds	Barley	=	48 Pounds
Oats	=	32 Pounds[2]	Corn & Sorghum	=	56 Pounds

Figure 1. ⮝⮝ Four sizes of Fairbanks grain scales 4, 2, 1pound, and 8 ounce capacity.

It is interesting to note that grain was used as the basis for the development of a weighing system. "The basis for standardization was a grain of wheat and this seed, commonly used in Europe, during the middle ages became the grain weight on which the present systems are built."[3] Other grains have also been used as standards in some countries.

The focus of this article will be on American grain testing scales consisting of a steelyard and bucket.[4] (Figure 1) Most of the scales are made of brass with iron hangers and pivots. However, Ohaus scales are made of cast aluminum and stainless steel.



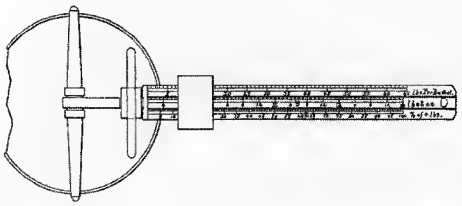


Figure 2. ⮝⮝ Patent no. 198,364 dated Dec. 18, 1877 and granted to F. Fairbanks.

The grain scales discussed in this article have a horizontal beam with three measures as shown on the patent drawing. (Figure 2)

1. The top measure shows the pounds per bushel of the grain sample.
2. The middle measure shows the weight of the sample.

Figure 3. ⮟⮟

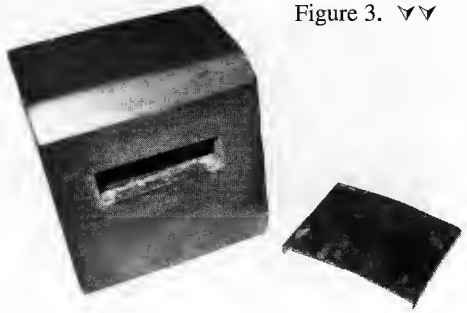
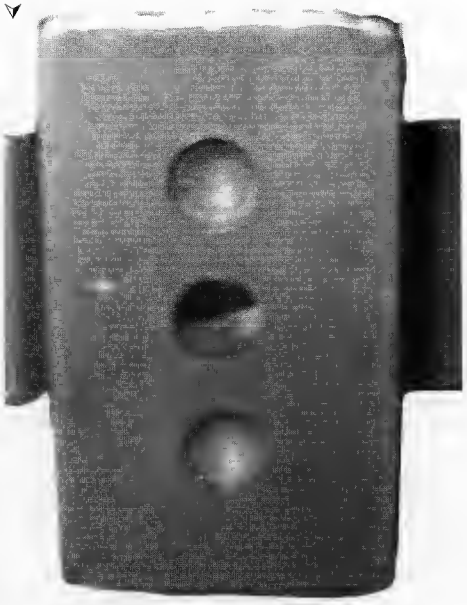


Figure 4. ⋏⋏

Figure 5. ⋎⋎



3. The bottom measure shows the percent weight after the sample is cleaned.

The beams have a stop on one end to prevent the poise from sliding off. The stop is either a flat brass plate or machine screw. The other end holds the iron hanger for the bucket, as well as a second iron hanger, with an attached ring or handles to hold the scale while weighing. Both of these hangers have an iron pivot to balance the scale.

The poise slides on the beam of the grain scale, but there is a friction plate under the beam to stop the poise from sliding freely. (Figure 3) Some scales have a groove on the underside to allow the friction plate to slide more easily. In most scales, there is a cavity in the poise, under the plate, that holds lead for calibrating the scale, and the scale is calibrated by adding or subtracting lead from the cavity. The poises are usually made of a single piece of brass or steel. However, Howe poises are usually made of two pieces, and the beam is also fitted in a slot on the hanger end of the scale. (Figure, 4) The Howe poise has a thin cap held by four

Figure 6. ⋎⋎

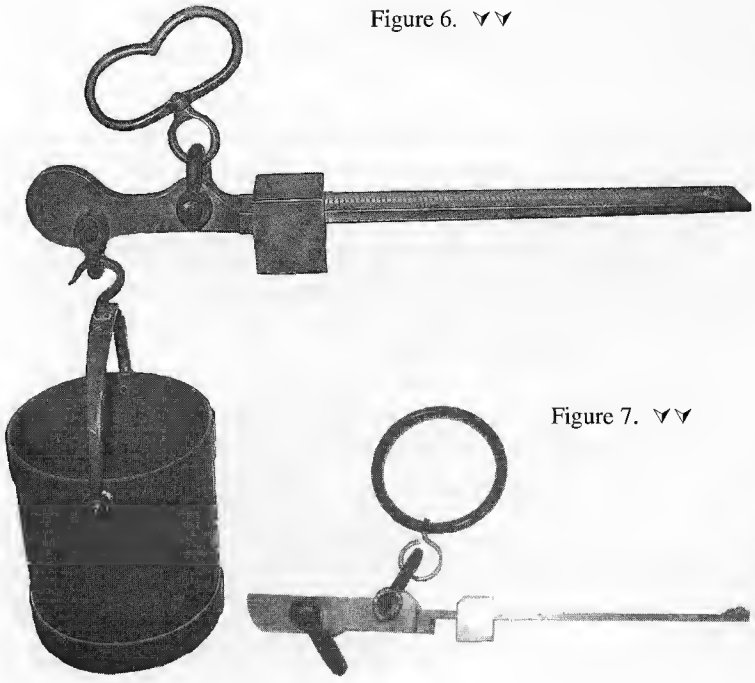


Figure 7. ⋎⋎

Figure 8. ⋎⋎

Figure 9. ⩛⩛

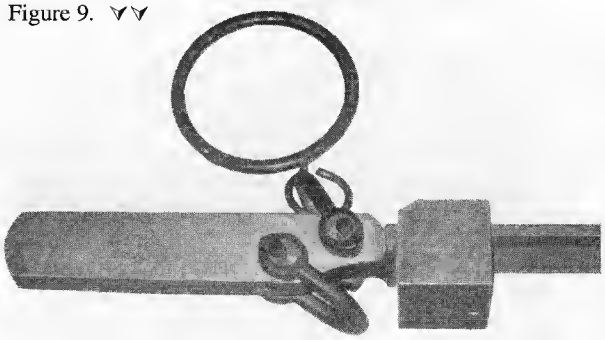


Figure 10. ⩛⩛

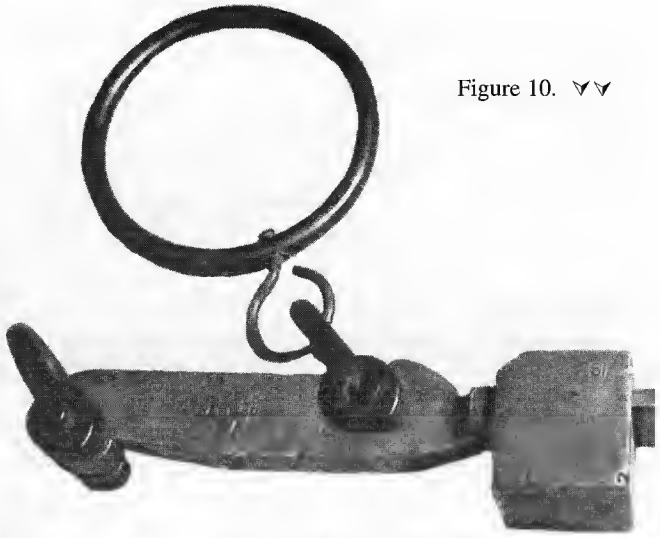


Figure 11. ⩛⩛

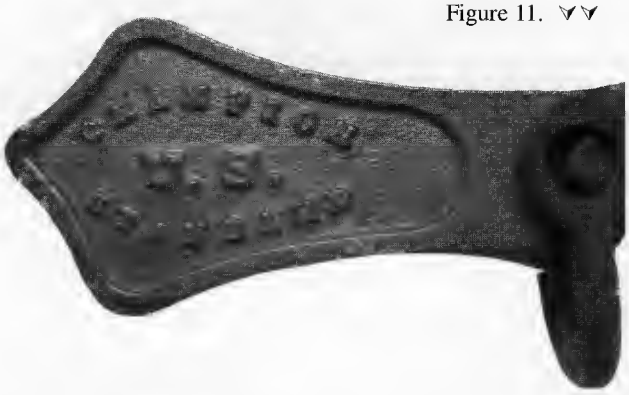


Figure 12. ⩛⩛

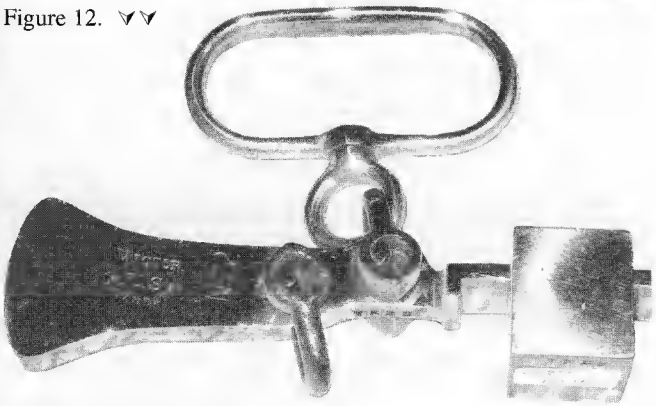


Figure 13. ⩛⩛

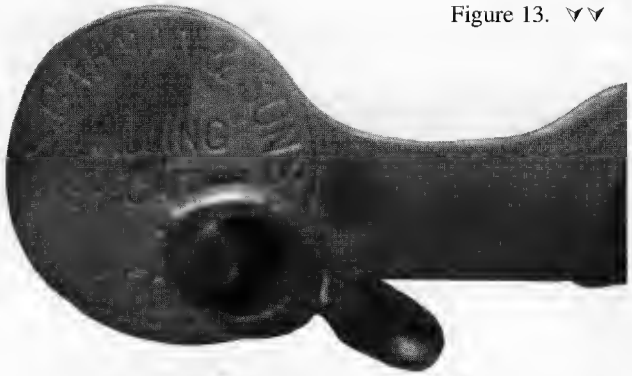


Figure 15. ⩙⩙

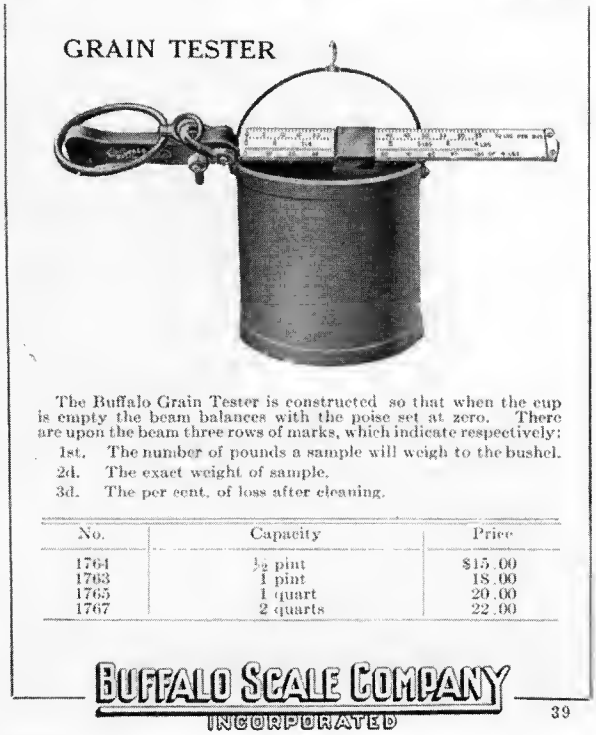


Figure 14. ⩙⩙

The scales come in four bucket sizes.
4 pounds or 2 quarts - dimensions are about 5½" H by 5¾" W.
2 pounds or 1 quart - dimensions are about 4" H by 4¾"W.
1 pound or 1 pint - dimensions are about 4¼" H by 3¼" W.
8 ounces or ½ pint - dimensions are about 3¼" by 2¾" W.

The lengths of the beams in Figure 1 are as follows:
4 pound - 13¼"
2 pound - 11¼"
1 pound - 10½"
8ounces - 9"

Figure 16.

pins. Howe drills the bottom of most poises to calibrate them. (Figure 5) The scale poises are almost square, usually with a slight bevel on the handle side. (Figure 4) Some poises are square without the bevel. (Figure 6) Grain scales should balance when the poise is set at zero and the bucket is attached.

The bucket holds the grain to be tested. Before weighing, the beam may be used to strike off the excess grain so the bucket is completely full.

Most manufacturers stamped matching numbers on the steelyard beam, the poise, and the bail of the bucket. Other identification may be made by observing the design of the beam, poise, and bucket. Most manufacturers used the same design for all of their beams. (Figure 1) However, Buffalo had several different end shapes. (Figures 6, 7, 8, 9, 10) Champion (Figure 11), Victor (Figure 12), and Garman (Figure 13) had a somewhat different end shape. Other lesser known makers had various end shapes, often with their name on the end where the bucket hangs. W. Greey and possibly others had a vertical rather than a horizontal beam.

The various Buffalo steelyards shapes are the same in catalogs reviewed for various years. The 1908 and 1923 Buffalo catalogs show the same beam in their advertisement (Figure 14). A 1930 catalog

Figure 17.

shows a beam similar to Fairbanks (Figure 1), but some have an oval shaped handle. (Figure 6) Some Buffalo scales have a steel ring with a hole to hold a brass ring that attaches to the scale hanger. (Figure 7) Howe scales inscribed the name "Howe" in early script or with stylized dots spelling Howe. (Figure 15) The Buffalo and Ohaus buckets usually have a strengthening strap at the top and bottom of the bucket. Other scales use the straps on some buckets.

Names found on grain scales include: A. S. Garman & Sons, Buffalo, Champion, Fairbanks, Gurley-Hamilton, Holbrooke, Howe, Lansing Bonnell, Marseilles Mfg. Co., Ohaus, Seed Trade Reporting Bureau, Standard Scale and Supply Co., Troemner, Victor, and W. Greey.

Fairbanks and perhaps other manufacturers produced a gravel scale, which can be confused with grain scales. The beam is similar, but it measures 21" long with a larger poise, and the bucket measures 6¼" by 6¼". The gravel scale also has a heavy, twisted brass wire and hook as a bail. (Figure17)

Dedication

This article is dedicated, by the author, to the late John Cattle, Sr. and his wife Virginia who generously allowed me to inspect and photograph some of John's grain scales. My interest and knowledge of grain scales has increased through my previous discussions with Mr. Cattle.

Acknowledgements

With thanks to Diana Crawforth-Hitchens, Bill Doniger, Graham Ford, Les Firth, Jan Berning, Dale Goldman, Virginia and Jay Cattle, and Larry Press.

Notes

1. *Equilibrium* pages 51-53 & 80-82.
2. Agriculture Publication G4020, Department of Agronomy, Unversity of Missouri, Columbia, MO, October 2, 1993, Page 1-2
3. J. T. Graham, *Weights and Measures*, Shire Publications, 1979, Page 3.
4. *Equilibrium* page 80, and 989.

References

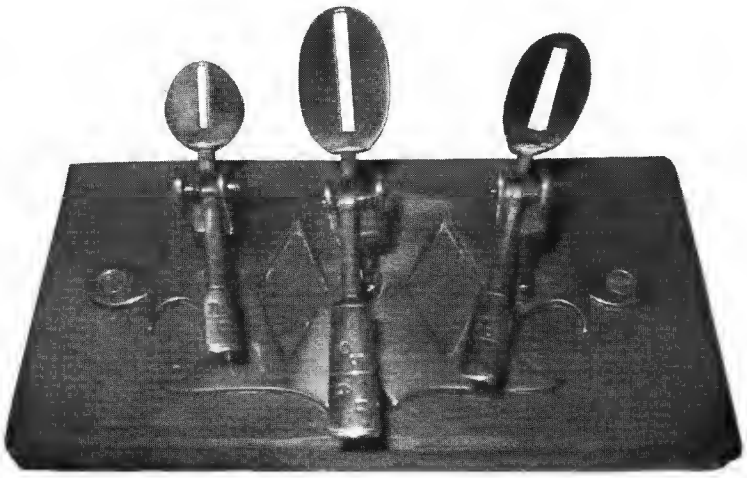
www.USPTO.gov

New York State Library

Minnesota Historical Society Library

Showcase

This anonymous English counterfeit coin detector was made to check small silver coins current from 1838. This type was made to check the sixpence, shilling and half-crown. The coin was checked first by weighing. If the rocker tipped, it was full weight. Then the diameter and thickness were checked by pushing the coin through the slot. J. Cheeseman collection.



US Patents, 1889

Many scale patents for this year were issued for coin-operated and computing scales.

Patents sorted by date, (shop/warehouse platform scales and smaller). 1888 - 1889.

NO.	DATE	INVENTOR	RESIDENCE	ASSIGNEE	TYPE
392,698	Nov 13, 1888	W R Smith & A L Washburn	Bandera, TX & NY, NY	Washburn to Smith	Coin operated scale
392,995	Nov 20, 1888	A H Deike	Guelph, Canada		Self indicating trunnion scale
393,299	Nov 20, 1888	C Dornbusch	Schlottwitz, Germany		Postal platform scale
393,325	Nov 20, 1888	J C J C Favre	Montreal, Canada		Coin operated scale
393,340	Nov 20, 1888	J H Nolan	Boston, MA		Spring postal scale
393,593	Nov 27, 1888	H Stone t & W H Pit	Brooklyn, NY	U S Weighing Machine Co	Coin operated scale
394,869	Dec 18, 1888	J Marquardt	New York, NY		Beer scale
395,926	Jan 8, 1889	G Salter	West Bromwich, England		Coin operated scale
396,285	Jan 15, 1889	J G McNeill	Ottawa, KS		Weight & price scale
396,394	Jan 22, 1889	W S Davenport	St. Johnsbury, VT		Coin operated scale
396,497	Jan 22, 1889	W Kent	Passaic, NJ	Springer Torsion Bal Co	Torsion balance truss
396,569	Jan 22, 1889	T H Herndon	Birmingham, AL		Dual indicating scale
397,040	Jan 29, 1899	O Van Denburgh	Schuylersville, NY		Weight & price scale
399,058	Mar 5, 1889	T Lieb	New York, NY		Beer scale
399,192	Mar 5, 1889	O A Gill	Baltimore, MD		Tea packaging scale
399,860	Mar 19, 1889	L C Farmer	Minneapolis, MN		Platform scale
399,865	Mar 19, 1889	J T Friend	Irvine, KY		Union sc & beam & sliding poise
400,400	Mar 26, 1889	P Guillaumin	Viron, France		Self verifying platform scale
402,748	May 7, 1889	F J Lancaster	New York, NY	Natl Weighing Machine Co	Coin controlled weighing machine
403,136	May 14, 1889	H Pooley	Liverpool, England		Steelyard for weighing machines
403,452	May 14, 1889	F Batter	Slide, CA	1/2 to W S Vanderburg	Hydrostatic scale
403,692	May 21, 1889	J H Nolan	Boston, MA		Spring letter scale with tare
403,693	May 21, 1889	J H Nolan	Boston, MA		Cylinder shaped spring letter scale
404,290	May 28, 1889	F Koch	Hanover, Germany		Sc 2 part beam & adjusting screw
405,370	June 18, 1889	W G McLaughlin	Springfield, MO		Beam indicating wt price, bushels
405,648	June 18, 1889	L Zwiesler	Kansas City, MO	1/2 to J Menclen	Weighing Scoop
406,132	Jul 2, 1889	J C J C Favre	Montreal, Canada	American Automaton Weighing Mach Co.	Coin controlled weighing machine
406,499	Jul 9, 1889	E F Bergman	Frankfort, NY	1/2 to J R Slack	Spring balance
406,518	Jul 9, 1889	C Forschner	New York, NY		Spring balance small
407,170	Jul 16, 1889	C Conmee	Port Arthur, Canada		Automatic weighing steelyard
407,483	Jul 23, 1889	H Knight	Ryde, Isle of Wight, England		Coin freed person weighing scale
407,825	Jul 30, 1889	S Hoadley	Gosport, IN		Price calculating cylinder for sc
409,080	Aug 13, 1889	W R Watt	Somerville, TN		Medicine or postal sc in case
409,191	Aug 20 1989	R E Glover	Granger, MO		Quadrant pharmacy scale
409,302	Aug 20 1989	E Roche	Rheims, France		Pendulum scale
410,389	Sep 3, 1889	L L Wands	West Shokan, NY	H Boice	Price indicating attachment for sc
410,952	Sep 10, 1889	E F Bergman	Frankfort, NY	1/2 to J R Slack	Hanging spring quadrant scale
411,336	Sep 17, 1889	T H Herndon	Birmingham, AL		Quadrant letter scale
411,576	Sep 24, 1889	J N Brown	Farwell, MI	1/2 to F E Presley	Weighing hand truck
412,049	Oct 1, 1889	E Side	Philadelphia, PA	J J Carr & F C Sturges	Automatic weighing scoop
413,331	Oct 22, 1889	W Snelgrove	Bankwood, England		Motorized poise movement
414,242	Nov 5, 1889	A T Jr & H B Nye	Cleveland, OH		Computing postal scale
415,221	Nov 19, 1889	T Sands	Nashua, NH		Platform scale
415,294	Nov 19, 1889	E G Hoffmann	New Southgate, England		Coin operated ticket scale

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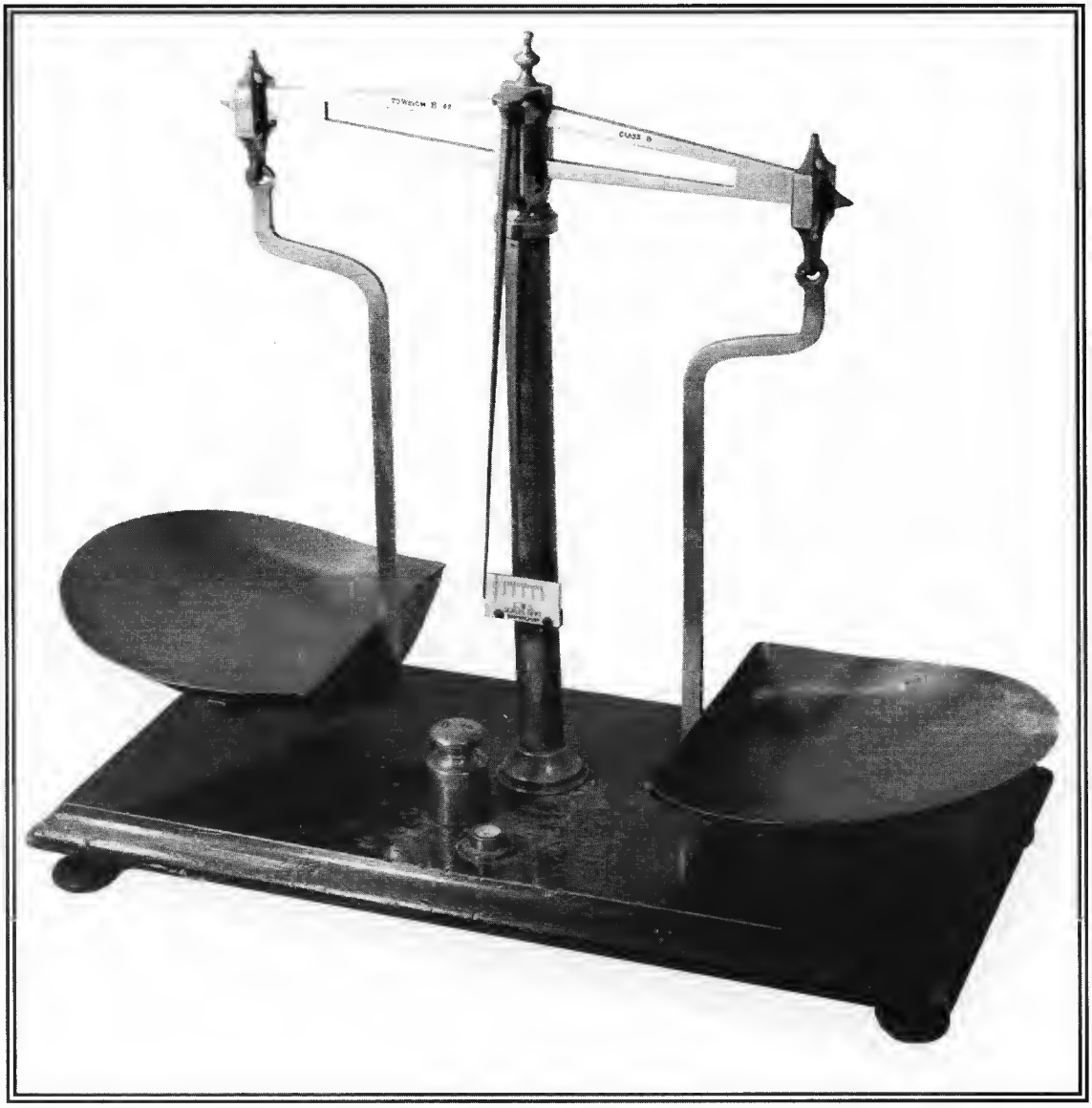

Cover Picture

This English bankers' scale has printed on the ivorine graduated arc that it was made for the C.W.S. SCALES DEPT. BIRMINGHAM. [C.W.S. is the abbreviation for the Co-operative Wholesale Society, a large group of shops that shared their dividends with their customers, not with shareholders.] It has an 11inch (295mm) beam with sharkey ends and two loose scoops to weigh copper coins. On the centre front of the 18inch (450mm) by 9inch (225mm) mahogany base is a small circular spirit level. Stamped on the beam is TO WEIGH 8 OZ and CLASS B so it was made about 1900. All the metal parts are made of brass. There is one bankers' weight for 8oz next to the spirit level.
Courtesy J Lound and the Co-op Collection, Leeds.

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Ancient Peruvian Standards & Scales

BY DR. S IWATA

1. Introduction

The ancient regional civilization of the Andes developed a system of weights and measures somewhat later than the civilizations of ancient Mesopotamia, ancient Egypt, ancient Indus, and ancient China. There are various theories regarding the mass standards used in this region, and suspect views of their scales are occasionally advanced. As part of the author's research on the history of measurement in the New World before the time of Columbus, this report discusses mass standards and scales on the continent of South America, particularly in ancient Peru, which formed part of the ancient Andean civilization.

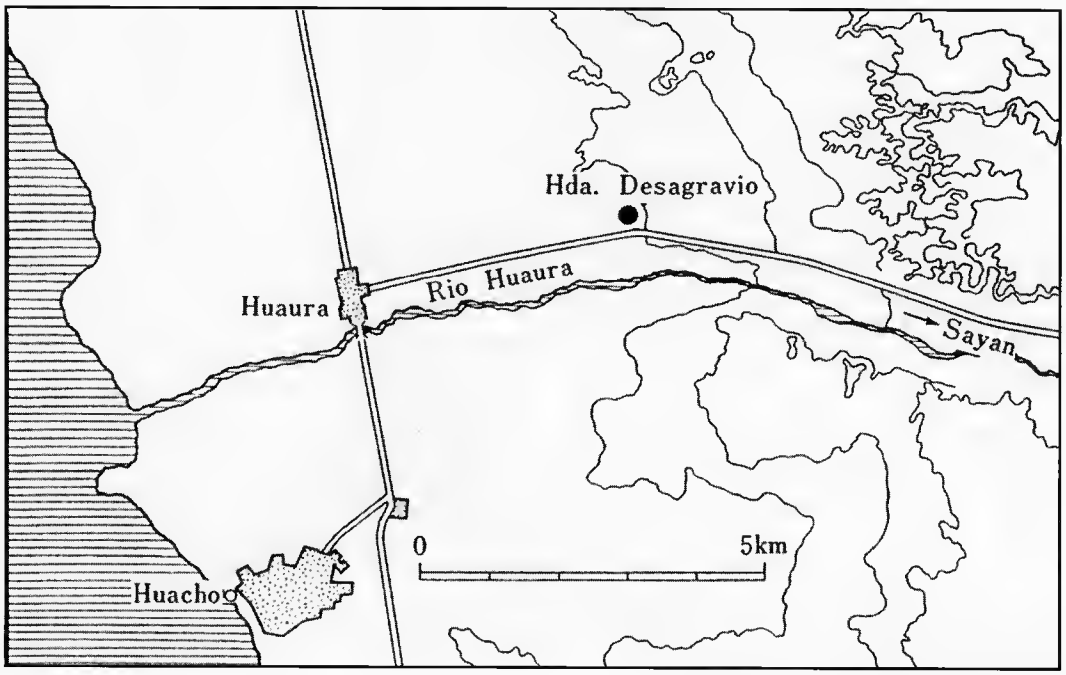

Fig. 1. ⅄⅄ Map showing location of the Hacienda de Desagravio site which was excavated by the Amano Museum.

2. Mass standards

2.1. Collecting the measured masses of the weights

The measured masses of the weights of ancient Peru are those announced by Erland Nordenskiöld[1] and those from the Museo Amano (Amano Museum) in Lima.[2] Among these, the weights collected by E. Gaffron, a medical counselor in Berlin were, according to Nordenskiöld, weighed by his son, Hans Gaffron.[1] When the author asked Hans Gaffron at his Florida home in the United States, Gaffron reported that the measurements had been made by his father, and that part of the collection now rests at the Art Institute of Chicago.[3] I couldn't find the weights that appear to be part of Gaffron's collection at the Art Institute of Chicago, and the mass of the weights is unknown. Thus, the values reported by Nordenskiöld have been used as the values for the weights in Gaffron's collection. These weights were discovered on the Hacienda de Sagrario near Huacho, but correct dating of this site has not been made. In response to the author's request, E. Gaffron's niece, Elena Gaffron, stated that they

Table 1. Location of Sites and related Regions

Place name	Location	
	Latitude	Longitude
Antioquia	6.36N	75.53W
Campanario	11.22S	77.26W
Caqui	11.31S	77.05W
Carquin	11.05S	77.55W
Chancay	11.36S	77.14W
Chincha	13.25S	76.07W
Chiquitoy	7.50S	78.32W
Desagravio	11.04S	77.34W
Huarochiri	12.08S	76.16W
Juliaca	15.29S	70.29W
Lauri	11.34S	77.12W
Lechcera	10.46S	77.55W
Lima	12.06S	77.03W
Miraflores	13.29S	77.13W
Nazca	14.53S	74.54W
Pachacamac	12.14S	76.52W
Paramonga	10.42S	77.50W
Piñal	0.54S	79.12W
Pisquillo	11.26S	77.10W
Puerto	10.03S	78.08W
Tambo Colorado	13.46S	76.12W
Thamara	11.06S	70.39W
Yanaoca	14.17S	71.25W

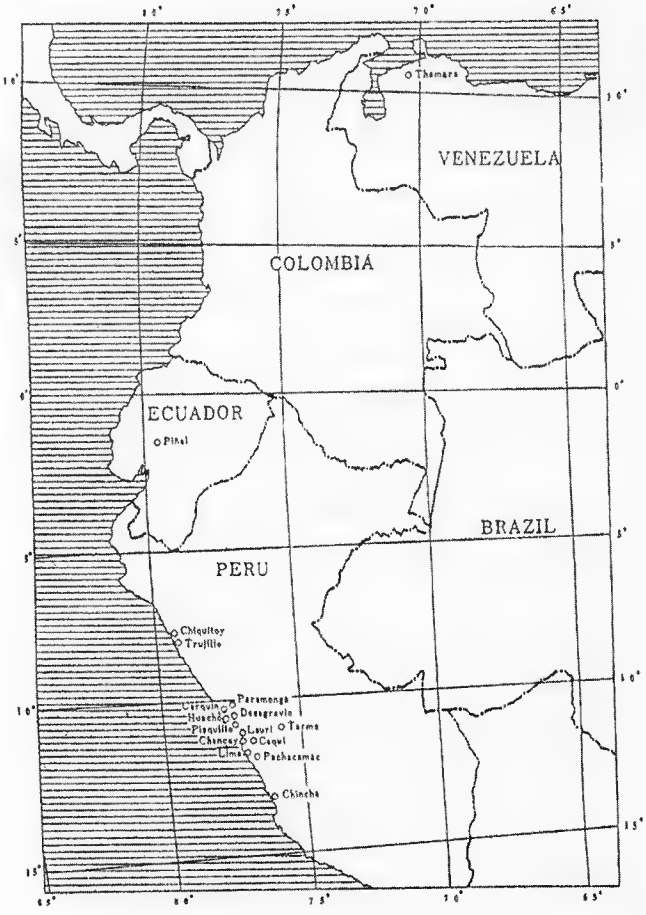

Figure 2 Map of sites in Northwestern South America.

had been unearthed on the Hacienda de Desagravio, which is approximately 4km north - northeast of Huacho, 145km north of Lima. The operator of the hacienda knew nothing of the site. But they had been rediscovered at the foot of a hill about 1.5km directly north of the entrance to the hacienda by Yoshitaro Amano, the curator of the Amano Museum.[4] Figure 1 shows the location of the Desagravio site, which was excavated by the Amano Museum. Based on the appearance of the skulls and skeletons, adobe (sun-dried bricks), pottery with black ornamentation against white ground, and patterns found on the cloth, the objects appear to date from after 1300. Cloth found at the same site (south latitude 11°4', west longitude, 77°34') on April 18, 1976, was used by Osamu Yamada of Kyoto Sangyo University to synthesize methanol. According to measurements of its ^{14}C (*Carbon 14*) performed with a liquid scintillator, the date of the cloth is assumed to be KSU-127, 690±20BP (by dendrochronology, about A.D. 1260). The half-life of the ^{14}C used for the dating is 5,568 years. BP is an abbreviation indicating "before present," signifying the number of years before the zero year, set to A.D. 1950.[5]

The measured values of the mass of the weights that are used in this study were those for weights whose location and age are known. The weights in the Amano Museum were weighed at the museum using a Roberval balance between October 1974 and February 1975.

2.2 Calculating the mass standard

Figure 3. Weights from Lauri.

Table 1 shows the locations of the sites and related regions, while Figure 2 is a map of sites found in northwestern South America. A total of 56 weights have been found here. Of these, 39% are made of stone, 32% of iron, 24% of lead, and 5% are made of other nonferrous metals. About one-third were globe-shaped; the rest were conical, cylindrical, spindle-shaped, or other irregular shape. Figure 3 and Figure 4 show some typical weights. Those in Figure 3 are lead weights unearthed at Lauri. The weights in the center and on the left in Figure 4 are lead weights from Chincha; the other is a lead weight from Chiquitoy. The center weight from Chincha is spindle-shaped, and its top is inlaid with agate. Its middle protrudes, and the line pattern on the left is engraved into the top of the weight. It is unclear whether this pattern corresponds to inscriptions seals used in other civilizations. The mass standard was calculated from the measured masses of the weights by a conventional method.[6] The results revealed a mass standard and standard deviation of 2.31g ± 0.152g. And it also revealed that the weight system was decimal-based. The results are shown in table 2. *(See page 2913)*

Figure 4 Weights from Chincha and Chiquitoy, and line engraving.

3. Scales

All the scales discovered up to the present are of the cord-pivot type. Table 3 is a table of scales at the Amano Museum.. The Campanario site is located about 7km east of the coast at Huarmey, about 280 km north of Lima. Figure 5 shows the scales found there. With dimensions of 10.6 by 1.35 by .8cm thick, they are perforated with 6 holes, with a diameter of 2.5mm. Categorizing the holes 1 to 6 from left to right, the distance from the left end to the center of the first hole is 1.00cm, and from the center of the first hole to the center of the second hole 1.50cm. Similarly, the distances are 1.81, 1.80, 1.81, and 1.80cm, while the distance from the sixth hole to the right end is 0.88cm. A hole is also found in the center of the left end linked to the first hole. If this represents a seventh hole, the device was probably used as a scale for fixed quantities by passing a cord through from the first hole to the seventh hole, suspending

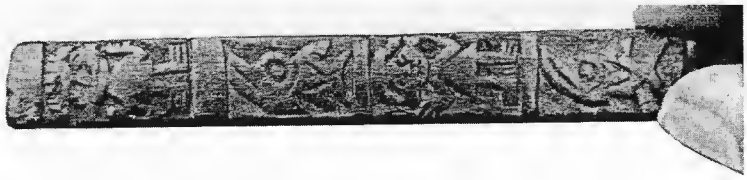

Figure 5 Scale for fixed quantities from Campanario.

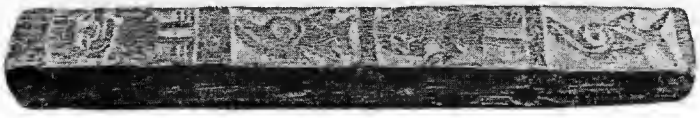

Figure 6. Balance from Lauri.

pans or nets from its ends, suspending a bob-weight from the sixth hole, and passing a cord through holes 2 to 5. The species of wood from Hualtaco is *Loxopterygium huasango*, a low tree that grows in semiarid regions. A firm and tough species resembling Japan's persimmon, *Loxopterygium huasango* provides wood used for building construction and for cabinetwork. Its leaves are used as animal feed.

Figure 6 shows the balance found at Lauri. The cord at its fulcrum is of cotton. The cord passed through the load point and power point was, as in ancient Egypt, passed through horizontally from the bottom end and fixed by forming a knot under the beam. At both ends of the beam, diamond-shaped nets were folded in two from their centers to form near-isosceles triangles. The bottoms of the nets and the suspended parts were reinforced with animal hair. The balance shown in Figure 6 and the weights shown in Figure 3 were discovered in a handbag woven in seven colors (shown in Figure 7). This handbag is 21 by 17cm, with a 54cm attached cord. The sensitivity of the balance (practical sensitivity) was measured and found to be 71mg.

Table 3. Table of Scales

Site name	Period (A.D.)	Material	Sculpture in beam	Beam length (cm)	Remarks
Campanario	1000-1200	Hualtaco (Wood)	Human figures, birds	10.6	Scale for fixed quantities, only beam found
Lauri	ca. 1300	Wood	Circles with a dot in the center	11.0	Balance, net at both ends
Lechcera		Hurango (Wood)	None	9.5	Balance, only beam found
Miraflores		Horn	Birds, circles with a dot in the center	10.6	Balance, only beam found
Pisquillo	ca. 1400	Bone	Monkeys	13.6 (Estimated)	Balance, only beam found, (only a partial beam)
Puerto	800- 900	ditto	Circles with a dot in the center	9.6	Balance, nets at both ends
Tambo Colorado	1470-1530			13.4	Balance, only beam found

Figure 7. ⩛⩛ Bag used to carry balance & weights from Lauri.

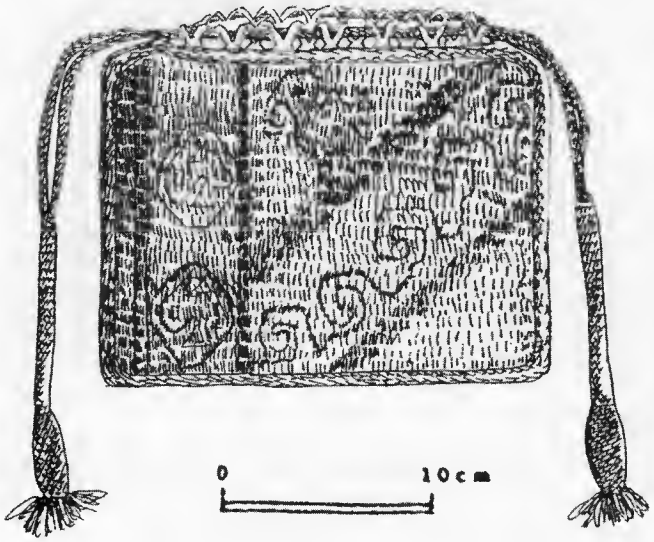

Figure 8 shows a balance discovered in Puerto, while Figure 9 shows part of its beam. The cord is passed through the balance in the same way as the Lauri balance and all others that were found with their cords still attached. Its length from the hole at the left end where the cord emerges to the bottom of the net is 34cm, while the length of the bottom of the net is 8cm. The edges of the net are completely reinforced with animal hair. The sensitivity of the balance is 93mg. The practical sensitivity of the balance with zero load used for adjustment of small weights, calculated with the mass and standard deviation of the weights provided in Table 2, is 22mg.[19]

Based on the seven balances and beams in the Amano Museum and the 10 balances and beams in the Art Institute of Chicago, if the length of the beam is 100, the minimum (mean) to the maximum beam widths are 10.4 - (17.9) - 34.7%, while the minimum (mean) to the maximum beam thicknesses are 1.8 - (4.9) - 8.4%. Since the balances found at Puerto in Huarmey on the seacoast 250km north of Lima are representative of the Tiahuanaco culture of the 9th century, they were assumed to be made no later than the 9th century.

On all cord-pivot type balances, the cord passes vertically through the hole to the bottom surface of the beam and is knotted at the bottom outlet of the hole, except in one found at Lechcera and listed on Table 3, which differs in that the cord passes through an L-shaped hole in the center of the beam. On each of those found with its cord still attached, the manner in which the cord passes through the load point and power point are, without exception, identical to the above-described balances found at Lauri and Puerto.

4. Considerations

4.1. Mass standard

According to Nordenskiöld,[1] because a label attached to a basket in which the balance was kept in Gaffron's Collection bears the words, "Fundort: Hacienda de Sagrario, cerca Huacho," E. Gaffron himself might have incorrectly recorded the name of the hacienda. Nordenskiöld believed that the 13 weights found among the site at this site show Spanish influences, but based on the results of ^{14}C dating, the weights appear to predate by some 270 years the Spanish arrival on the cost of Peru in A.D. 1532. Such a date would clearly rule out a Spanish influence.

No records of mass standards can be found for the period immediately after Francisco Pizarro's invasion in 1532, of the region that is now Peru. According to Nordenskiöld[7], the Pacubuyes tribe discovered at Thamara, near Lake Maracaibo in present-day Venezuela, by Alfinger in A.D. 1531, were using "Roman balances."

Figure 8. ⋏⋏ Balance from Puerto.

The Spanish units at the time were as follows: 1 quintal = 4 arroba = 100 libra = 200 marco = 1,600 onza = 6,400 quarto = 12,800 ochava = 25,600 adarme = 76,800 tomine = 921,600 grano = 46.0016 kg.[9] The ratios between the adjacent units are 1:4:25:2:8:4:2:2:3:12, a non-decimal system. Additionally, 1.5g differs from the Spanish units. According to Oviedo y Valdés,[8] the Spanish used units designed to measure from ½ of a castellano gold coin; that is, from 48 granos to 1 marco, which equaled 50 castellano gold coins, each weighing 8 onzas. Because 1 marco = 230.008g, and because the mass of a castellano gold coin is 4.6g,[9] the units are 2.3g and 230g: a unit close to the 2.31g ± 0.152g calculated in Table 2, and a unit 100-fold greater. Table 2 indicates use of a decimal system, and the units estimated from the weights are 0.0231g, 0.231g, 2.31g,23.1g, and 231g. The quartz weight found by P. Rivet at Piñal upstream of the River Daule in Ecuador was 46.30g,[11] a mass about double 23.1g. Therefore, although its dating is unclear, there is a strong possibility that a single mass standard was used in northwestern South America prior to A.D. 1532.

E. Nordenskiöld[1] reports that the weights from Desagravio were Spanish-influenced and their unit was 1.53g. The weights in the Göteborg Museum are unique, with units ranging from 3.72 to 3.86g. E. von Hornbostel[13] reports that there were two mass standards in ancient Peru, related at the ratio of 20:21. The units of 4.56g and 4.79g are the ancient Spanish (New Babylonian "King" standard) and oldest "unique" Sumerian standard, respectively. Both Nordenskiöld and von Hornbostel based their research solely on the weights from Desagravio and from the Göteborg Museum. Due to the small number of these samples, it appears that they were misinterpreted. Having already researched mass standards from 2,500 B.C. to 500B.C. in ancient Mesopotamia,[6] the author has confirmed that a single mass standard was used with both decimal system and sexagesimal system. Since ancient Peruvians used only a decimal system and a mass standard that significantly differs from the unit used from Sumeria to Babylonia (1 gin = 8.255g 2000 B.C.) and that the periods differ widely, a direction link appears to be ruled out. Research by Maria Rostworowski De Diez Canseco[14] focusing on linguistic aspects also clearly demonstrates that only the decimal system was used.

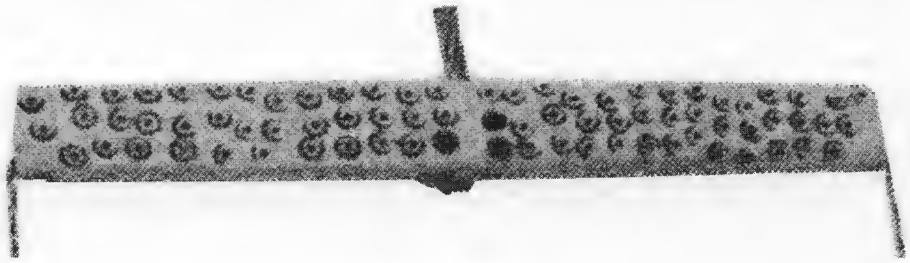

Figure 9. ≺≺ Beam of a balance from Puerto

Figure 10. ⅄⅄ Balance from Yanaoca in use.

4.2 Scales

No scales believed to date from the pre-Columbus era have been found in North America (Mexico and Central America).[15] Since the 16th century, people traveling from the Old World to visit the northwest part of South America saw natives using balances and steelyards to weigh precious metals and coca leaves. For example, in 1525, Bartolomé Ruiz saw gold weighed in this manner on the coast of Ecuador; in 1531, Oviedo y Valdés saw gold and silver weighed at Thamara in Venezuala, and Miguel de Estete saw gold and silver weighed on the coast of Ecuador; in 1540, Cieze de Leon saw gold weighed at Antioquia in Columbia.[7] The report by Miguel de Estete is of particular interest: "*Numbers were engraved from the center to the end of the rod, and a bob-weight attached to the rod.*" It is said that in pre-Colombian South America, the natives did not use a written language and employed knotted cords called quipu for book-keeping. But some have also argued that natives used hieroglyphic writing on woven fabrics,[14] which have yet to be deciphered. If we can be certain that these represent figures, their systems of weights and measurements will be understood more accurately.

The structures of the fulcrums of the earliest balance discovered in the sites of all civilizations are of the cord-pivot type: suspended by a cord through a vertical hole in the center of the beam. The next type occurring on the timeline is the central-pin type, in which a metal pin passes through a lateral hole in the center of the beam. Further progress led to the development of the knife-edge type, consisting of a knife-edge and knife-edge bearing, achieving ever more precise balance.[16] The dates of the oldest balance that have been found are between 3,500 and 3,200 B.C. in ancient Egypt, and between 350 and 300 B.C. in China. Both are of the cord-pivot type. In Peru, the earliest known cord-pivot type balance, which was discovered in Puerto, appears to date from between A.D. 800 and 900. If ancient Peru had a close connection with any Old World civilizations, the first to appear would probably have been the central-pin type. Since the device was found in the northwestern part of South America, it is likely to have been invented by the natives of that region. The actual measured sensitivities of the balance found at Puerto and Lauri were 93mg and 71mg. E. Nordenskiöld reports that the sensitivity of a balance from Nazca was 50mg.[1] Because there are many scales that have not been examined and many excavations are

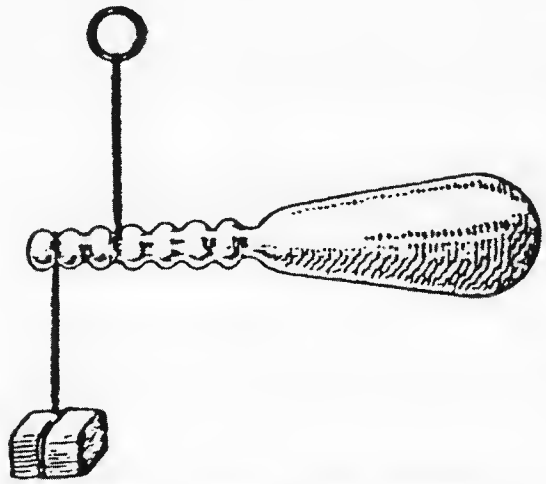

Figure 11. ⅄⅄ Movable fulcrum scale: Bismar.

currently underway, there is a strong possibility that one with a sensitivity approximating the measured value of 22mg will be found. Hiroshi Sakane of the Amano Museum observed a woman using a cord-pivot balance at the Sunday market in Yanaoca about 130km south-east of Cusco in June 1978.[17] Like the oldest balance found in Egypt, the middle of the beam was thicker in two steps to minimize deflection, and hooks were positioned at its load point and power point. The balance was being used to measure coca leaves. The Quechua trader suspended a cloth bag containing a standard weight of coca leaves on the left side, then hung a PVC bag containing the coca leaves she was selling on the right side to balance them (Figure 10). Although this balance is not an ancient artifact, this use is part of an ancient tradition extending back before the time at which the use of weights appeared. A cord-pivot type balance with a hook at one end and a pan on the other end has been discovered in nearby Juliaca.[16]

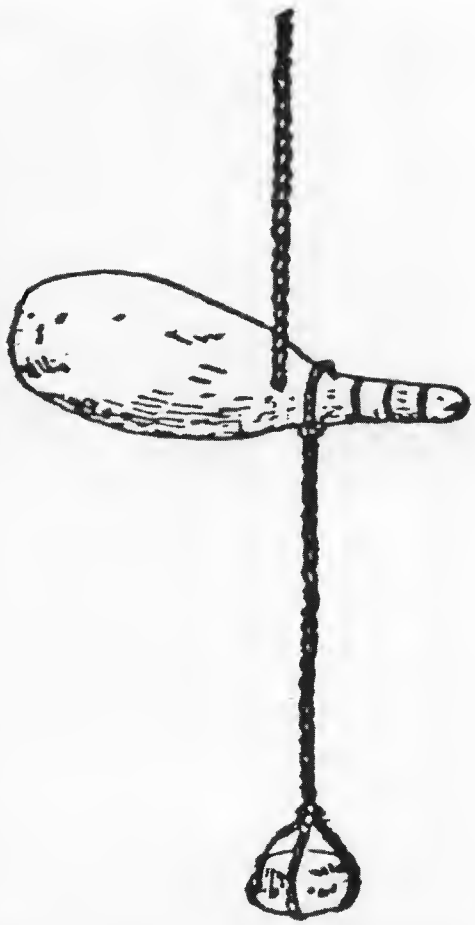

Figure 12. Movable load point scale.

Because measuring devices were developed later in ancient Peru than in other civilizations, so-called primitive balances that have almost disappeared in other regions of the world have been found in Peru. One of these is a bismar with a fixed load point and moving fulcrum point, collected in 1899 in a market in Tarma by Max Uhle.[18] Shown in Figure 11, this bismar is 27.8cm long; and if its fulcrum is set at point a, it is capable of weighing up to 1 libre (460g). If the mass at the two locations not identified by letters of the alphabet are estimated and the unit is assumed to be 23g, their ratios are , from the left, 40, 20, 10, 7.5, 5, 2.5. According to a report by P. Rivet,[10] around 1920, J.C. Tello and P. Miranda discovered the movable load point scale shown in Figure 12 at Huarochiri.[10] This is called a wipe in that region, a word missing from Quechua dictionaries. It is not clear to which masses the four grooves correspond. The scale was used by the people of that region to measure coca leaves.

In almost all civilizations, the type of scale appearing first and the ancestor of later scales is a cord-pivot balance with a fulcrum in the middle of a single beam and its load point and power point at opposite ends, equidistant from the fulcrum. A cord made from fiber is attached to its fulcrum, while cords, hooks, trays, or nets are suspended from their load points and power point. It is assumed that these devices were not originally used with weights. Instead, a standard quantity of the same material being weighed was likely used as a standard, as in the case of the balance observed at Yanaoca. A single rod with the same section shape was probably used as a beam. Later, with the invention of weights, the centers of the beams were reinforced by increasing their thickness in either 1 step (Egypt) or 2 steps (Yanaoca) in order to minimize deflection of the beam when weighing larger masses. Riders

came into use, replacing the custom of adding or removing small weights. In ancient Rome, for example, two types of scales appeared. One kind involved balances with pans attached to riders. The second involved steelyards without a pan on the rider side. The scale observed by Miguel de Estete in Ecuador and described thus: *"Numbers were engraved from the center to the end of the rod, and a bob-weight attached to the rod."* was probably devised immediately after balances were replaced with steelyards. Immediately after the change from balances to steelyards, the fulcrum remained in the center of the beam, as in balance, but as it gradually shifted close to the load point, the graduations lengthened to occupy most of the length of the beam. As the number of fulcrums increased and compound steelyards capable of weighing materials at various levels of precision were being developed, scales for fixed quantities that weigh a number of coins and other objects with fixed weights equal to the number of fulcrums were being devised. The scale for fixed quantities from Campanario might have been devised at this stage, when precious metals such as gold and silver presumably were being weighed.

Based on the concept of the rider-equipped balance, various types of balances were invented, in addition to single steelyards that are movable power point scales, movable fulcrum scales called bismars (Figure 11) and movable load point scales (Figure 12) were invented in rapid succession.

Units and mass standards differed among the ancient Mesopotamian,[6] Egyptian, and Indus[9] civilizations, indicating that their original metrological systems developed independently. But since these three regions are positioned on a precision balance limit sensitivity curve,[16] it appears that the advance of balance in these civilizations influenced each other. This tradition was inherited by Rome, Islam, and Europe. In contrast, the sensitivity of balances in China[20] and in Peru diverge sharply from this curve, indicating that they developed independently. Since the circumstances surrounding the discovery of the weights from Nazca in Table 2 are unclear, we can extrapolate from the 11th century weights in the Amano Museum, and the weights in Table 3, which date from the 9th century, that balances were invented in Peru in the 9th century. But considering the shape and structure of this kind of balance, they appear to have been invented in a process of a general advance of balances. Thus, they would not have been the first scales used in the region. It seems quite likely that some earlier versions of balances will be excavated in the future in northwestern South America. The 9th century was the age of the Wari Empire (A.D.700 to 1,000), which later broke up into regional nations (A.D. 1100 to 1470) that were finally united under the Tahuantinsuyu Empire (Inca Empire A.D. 1430 to 1532).

The world "Balance Romaine (Roman scales)" is still used to describe the scales of Peru.[7, 10, 17] But as stated above, because this region had no direct links with Rome, the names of each type of scale could be changed for the sake of nomenclatural accuracy, as argued in this report.

To prepare this report, the author was able to draw on many more sources than the weights and scales studied by Erland Nordenskiöld[1] and E. Von Hornbostel.[12] But nevertheless, the evidence of currently available sites is insufficient. Additional sources will likely make it possible to obtain an even more accurate understanding of these issues.

5. Conclusions

My conclusions concerning the mass standards and scales used in ancient Peru are given below:

5.1. The mass standard and standard deviation is 2.31g ± 0.152g, and the system is decimal-based.

5.2. Balances were used at least as early as the 9th century in ancient Peru. The cord-pivot type does not appear until A.D. 1532. The maximum sensitivity of a balance with zero load is 22mg, based on the weights.

5.3. It is presumed that bismars with movable fulcrums and scales with movable load points were used in parallel with the original scales that had movable power points.

5.4. These questions call for further research, based on more numerous primary sources.

Notes

1. Nordenskiöld, Erland: *The Ancient Peruvian System of Weights*, Man, No. 155, 1930, pp. 215-221.

2. Yoshitaro Amano: Private correspondence, Jan. 6, 1975, Feb. 25, 1975. The weighing was done by Yoshitaro and by Shiego Iwata. Part of this research has been published in item 16.

3. Hans Gaffron: Private correspondence, Nov. 2, 1978. I have been told that part of the collection is in Munich in Germany, but I have not confirmed its exact location.

4. Yoshitaro Amano: Private correspondence, Oct. 29, 1974.

5. Osamu Yamada, now being submitted, private correspondence, Nov. 23, 1981. The carbon content is 3.495g, and the measurements were made on July 17, July 23, and Aug. 2, 1976.

6. Iwata, Shiego: *Changes in Mass Standards in Ancient Mesopotamia*, Orient, Volume 25, No.1, 1982, pp.1-16.

7. Nordenskiöld, Erland: "Emploi de la Balance Romaine en Amérique du Sud avant la Conquéte", *Journal de la Société des Américanistes*, Paris, 1921, T.XIII, fasc. 2, pp 169-171.

8. Oviedo y Valdée, Gonzalo Fernández de, *Historia general y natural de las Indias, islas y Tierra-filme del mar océano*, Madrid, Edition José Amador de los Rios, 1851-5, T. II, p274.

9. Doursther, Horace: *Dictionnaire Universel des Poids et Mesures,* Amsterdam, Meridian Publishing Co., 1965, pp 92, 160, 247~251, 366~369.

10. Rivet, P.: *La Balance Romaine au Pérou,* l'Antropolpgie, Paris, 33, 1923, pp. 535~538.

11. Nordenskiöld, E. stated that it is 46.5g in the document in 1, but is probably an error.

12. Hornbostel, E. von: *Die Herkunft der altperuanischen Gewichtsnorm*, Authropos, 26, 1931, pp. 255~258.

13. Saville, Marshall H.: *Indian Notes*, Museum of the American Indian, Heye Foundation, New York, II, 1925, pp. 265~285.

14. María Rostworowski De Dies Canseco: *Cuadernos Prehispanicos*, 6, 1978, pp. 21~48.

15. de la Jara, Victoria: *la Solución del Problema de la Escritura Peruana*, Revista del Museo de Arqueologia de la Universidad de San Maecos, Lima, 2, 1970, pp. 27~35.

16. Iwata, Iwata,: *Development of Sensitivity of the Precision Balance*, Travaux Du ler Congres International De La Metrologie Historique, Zagreb, 28-30. Octobre 1975, pp. 1~26.

17. Hiroshi Sakane: Private correspondence, Nov. 8, 1978.

18. Uhle, Max: *La Balance Romaine au Pérou*, Société des Américanister de Paris, 17, 1925, pp. 335~336.

19. Iwata, Iwata,: *Standard deviation of Indus weights*, Orient, Vol. 17, No. 2, 1975, pp. 13~26.

20. Liu Dongrui: On the "King" Copper Sale with the Unequal-arm in the Age of the Warring States, *Wen Wu* (Cultural Relics), No. 4., 1979, pp.73~76. The sensitivity was 0.1g between 350 and 300 B.C.

Author's Biography:

Dr. Iwata's biography can be found in EQM on page 319.

Editor's Note:*The Editor was unable to contact the author to assure the accuracy of facts stated in this article.*

Table 2. Mass Standards in Ancient Peru

Collection	Gaffron's Collection	Götenborg Museum		Museo Amano								Mean Value	Standard deviation	Unit mass	Weighted ratio	Mass standard ± standard deviation (g±g)
Location discovered	Disgravio	Nazca	Pachacamac	Caqui	Carwuin	Chancay	Chincha	Chiquitoy	Lauri	Paramonga	Pisquillo					
Period / Ratio	ca.A.D.1260	A.D.1000-1200	A.D.1000-1400	ca.A.D.1440	ca.A.D.1300	A.D.1200-1500	A.D.1400-1500	A.D.1000-1400	ca.A.D.1300	A.D.1200-1500	ca.A.D.1400	(g)	(±g)	(g)		
0.01		0.0296										0.0296		2.96	1	
0.1		0.2806										0.2806		2.806	1	
0.5			1.09									1.09		2.18	1	
0.7	1.53		1.64									1.59	0.078	2.19	1	
1.0			2.13									2.435	0.431	2.435	1	
			2.74													
1.5			3.72									3.79	0.099	2.53	2	
			3.86													
2.0	4.5											4.47	0.028	2.235	8	
	4.49															
2.5					5.85					6.25		6.05	0.283	2.42	1	
3.5	7.80				7.50							7.89	0.301	2.25	7	
	8.10								8.15							
4.0					8.55							8.90	0.495	2.225	1	
					9.25											
					10.05					10.00						2.31
5.0			11.20		11.10							10.975	0.790	2.195	4	
					11.60		11.90									±0.152
6.0	14.60				13.65							14.125	0.672	2.354	1	
7.0	15.71			15.20			15.40		15.05			15.48	0.400	2.211	1	
	16.04															
8.0	18.44					17.50						17.97	0.665	2.246	1	
9.0						19.80						20.68	0.957	2.298	4	
					20.55	21.70										
10	23.43				24.50	23.00						23.64	0.772	2.364	5	
15	27.44															
	27.50											29.75	2.092	1.983	8	
	29.17				29.30	29.90			32.00		32.95					
20									41.25			46.70	7.707	2.335	1	
									52.15							
30			69.41			72.30						70.855	2.044	2.362	2	
40			95.23						95.05			95.14	0.127	2.379	36	
50									105.70			105.70		2.1140	1	
60									132.90			132.90		2.2150	1	
90								202.00				202.00		2.2444	1	

Gibson Parcel Post Scale

BY B BERNING

Donald Gibson of Delton, Wisconsin was an inventor and tinkerer, building all kinds of machines and gadgets to use on the family farm. In 1916 he saw a need for a han- held 50 pound capacity computing parcel post scale. He designed an accurate scale that was simple to use and inexpensive to produce. Living on a farm in south central Wisconsin, his only access to a patent lawyer was by mail.

Chandlee & Chandlee was a Washington, DC law firm specializing in obtaining patents for small inventors at low fees. They had been patent attorneys for over 20 years, recruiting inventors with their magazine ads. Gibson might have seen the full page ad (Figure1) in the January, 1917 issue of *Popular Mechanics* as it was about this time he wrote to the firm requesting "How to Obtain a Patent" and "What to invent", two free books offered by them. Gibson received a form letter dated February 15, 1917 from Chandlee & Chandlee, Attorneys, in Washington, D.C. It detailed the procedure and fees to obtain a patent. The minimum charge for a patent was $65. The first step was to send a drawing and description or model of the invention. After examining the invention, they would offer a free opinion as to patentability.

A week later he received another form letter from Chandlee & Chandlee with information regarding the sale of a patent and again requesting a description or model of his invention. After receiving the first letter, Gibson sent them a description of his parcel post scale.

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Please Mention Popular Mechanics

Figure 1. This advertisement appeared in the January 1917 issue of Popular Mechanics.

The next letter he received was dated March 1, 1917. It was another form letter. This one stating his idea had been examined and they were pleased to report that his "*article was proper subject matter for a patent*", and again asking for money. Also received along with this letter was an official looking certificate signed and sealed by Chandlee & Chandlee. This was their "opinion as to patentability" certificate stating in part "*We do hereby give our opinion that the said invention is patentable subject matter*".

The next day he received another form letter dated March 2, 1917, again asking for his first payment of either $10 or $25. After receiving this letter, Gibson mailed in his first payment of $25 along with four questions he had concerning his patent.

The answers to his questions arrived typed on the back of another form letter dated March 12, 1917. This letter acknowledged the receipt of his $25 fee. The answer to his first question regarding foreign patents and fees on obtaining them was contained in the text of the form letter. It stated that patents in Mexico cost $65, Canada $45, England $70, France $65 and Germany $65. One

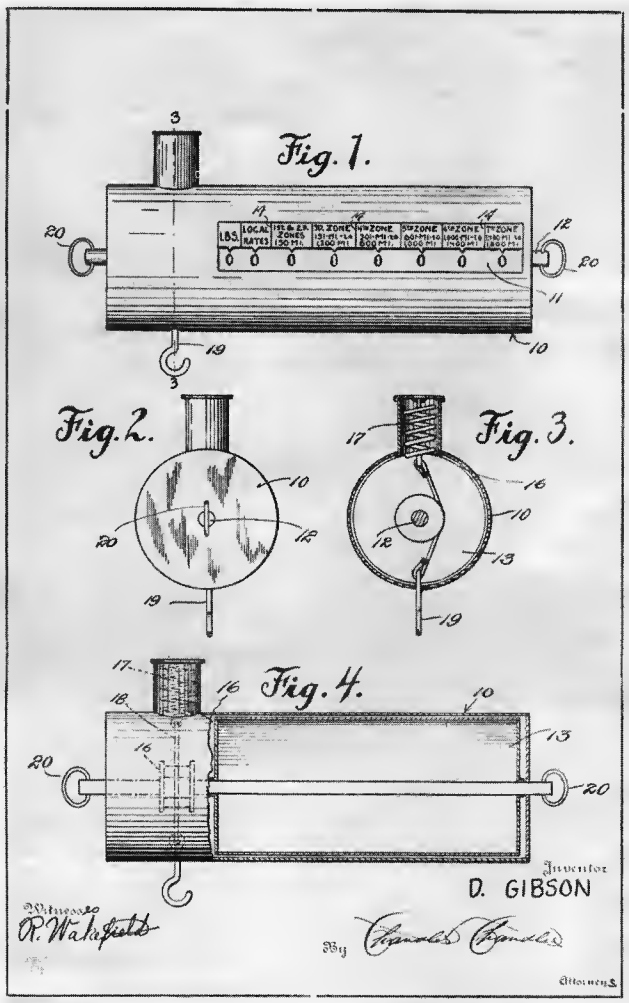


Figure 2. ⩙⩙ The original drawing differed from the final drawing in that the handles were connected to the main shaft of the rotating drum.

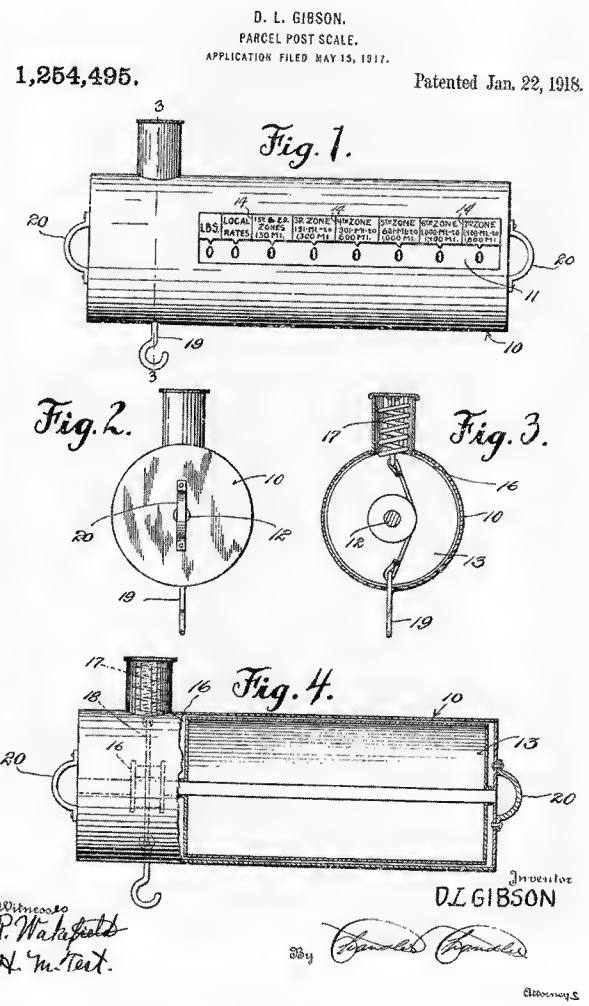


Figure 3. ⩙⩙ In the final patent drawing and on the model the larger handles are attached to the casing of the scale.

question answered on the back was concerning the cost of a model. They could not answer this as it was out of their line. They also gave him the same answer to his question as to the value of his patent. He also asked if he could sell his patent without his parents' assistance. They advised him "*you will be at liberty to dispose of your invention at any time you see fit, and without the assistance of your parents.*" Donald Gibson was only 16 years old. The next letter he received was dated April 19, 1917. This was the first letter from Chandlee & Chandlee that was not a form letter. His parcel post scale drawings were complete and were to be sent to him that week.

A few days later he received the drawings and the formal patent description. He received the final papers for his signature along with a letter dated April 25, 1917. He signed the oath and mailed it along with the second payment of $31.25. He also had a concern about the patent drawing for his scale. He had designed the scale to compute postage in eight zones, but the drawing contained only seven.

A letter dated May 9, 1917 explained the omission of the eighth zone. His attorney explained "*the*

Figure 4. ⋏⋏ The numerals on the zone chart are hand stamped and cover postage for 8 zones.

numbers of the zones may be increased or decreased, as desired, it will not make any difference how many or how few zones are shown on the drawing". Another form letter dated May 22, 1917 was received along with a receipt from the patent office indicating the first payment of $15 was received May 15, 1917. Chandlee & Chandlee also offered to sell a sales kit consisting of 500 illustrated circulars and letter heads, a form letter to send to manufacturers, lists of manufactures, rubber stamp, ink pad and other sales items.

It was late June and Gibson had not heard a word on the status of his patent. He inquired about the slow progress and was informed in a letter dated July 3, 1917, that there was no information available from the patent office and he would be notified immediately "*upon receipt of favorable information regarding the case*." In a letter dated October 13, 1917, Gibson received word of a delay at the patent office. A patent examiner objected to a portion of the patent application. Chandlee & Chandlee prepared an amendment to the application, redrew the scale, and resubmitted it to the patent office September 7, 1917. The letter concluded "*There is nothing that we can do to hurry matters, as applications are acted upon by the patent office in turn.*" (The only difference between the original drawing and the final patent are larger handles that are connected to the ends of the scale housing, not the central shaft.)

December 22, 1917 was the day Gibson mailed the final government fee of $22.50, and $14 to cover the cost of the "patent selling outfit", to his attorneys. They advised him in a December 28, 1917 letter that "*the final fee had been paid into the patent office as a result of which your patent will issue on January 22nd, 1918*".

Soon after that, 17 year old Donald Gibson received a large envelope from the Department of the Interior containing his official patent certificate. It was United States Patent number 1,254,495 issued January 22, 1918, to Donald L. Gibson for his parcel-post scales, for the term of 17 years. It was a large certificate containing a drawing and description of the scale bound with a blue ribbon and sealed with a red patent office seal. As soon as his patent was issued, he received solicitations from foreign patent attorneys, patent and invention publications, manufacturing companies and others, all wanting

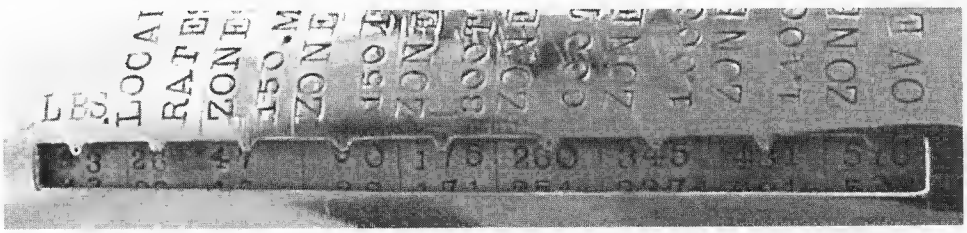


Figure 5. ⋖⋖ This photo shows the computing drum (dial). A 43lb. parcel would cost $5.16 to mail to Zone 8 over 1800 miles away. The capacity of the Gibson Parcel Post Scale is fifty pounds.

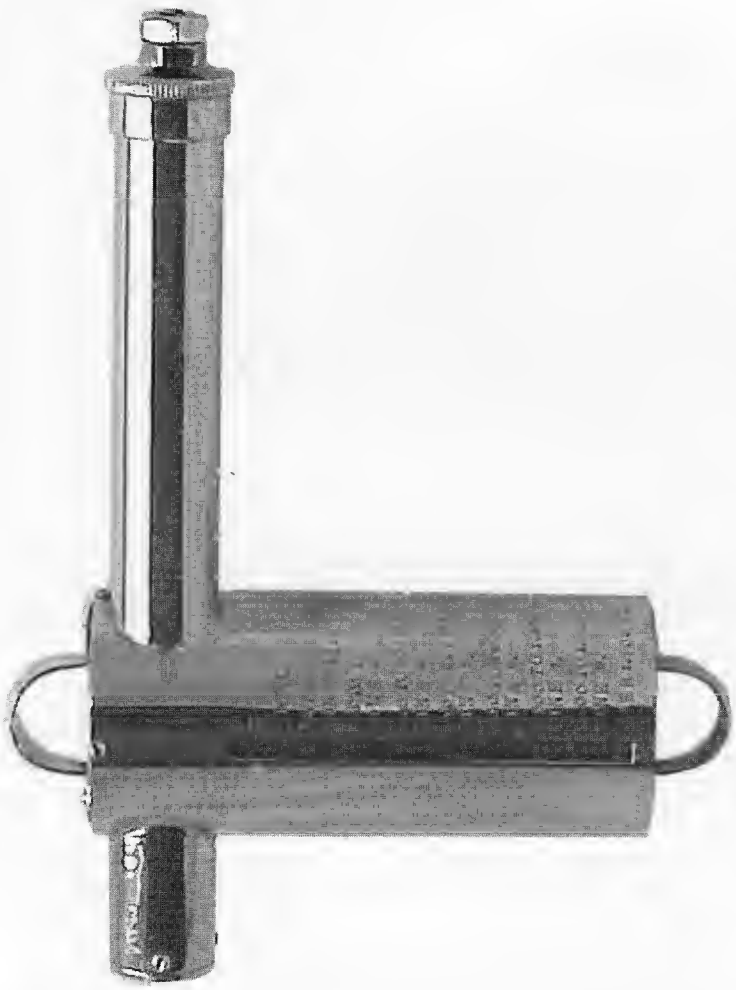


Figure 6. ⮜⮜ This prototype is the only example of the Gibson Parcel Post Scale ever made. The hook which originally hung from the bottom of the short tube, is the only part that is missing.

to make money from his newly invented scale.

Gibson did not have a working sample of his scale. One of the companies he was contacted by was Manufacturing Development Company, of Indianapolis, Indiana, specializing in patent models and experimental machinery. He hired them to build a sample of his scale. By June, 1918, he had his finished working model. It was of excellent quality, all hand made, and similar to the revised final patent drawing. The handles on each end were slightly larger than the drawing, but still too small to comfortably hold. It also computed rates for eight zones, just as Gibson had planned. It was six inches long from handle to handle and about two inches in diameter. It was made of heavily plated brass with all of the numbers and lettering hand stamped into the metal. One postal rate example taken from this scale would be for a 42 pound parcel mailed to zone 7 (1400 - 1800 miles) would cost $4.21. This sample is the only scale that was ever manufactured under this patent.

Donald Gibson died from his third bout of pneumonia on November 7, 1924, at the General Hospital in Madison, Wisconsin. After Donald Gibson died, his father Robert Gibson kept the scale, patent and the papers in a trunk for many years. When Robert Gibson died, the scale was passed down to other relatives where it sat untouched for many years. In June of 2000, the family sold the scale to the author.

Figure 7. ➢➢ Donald Gibson was only 17 years old when he was issued Patent number 1,254,495 for his parcel post scale.

Acknowledgements:

The author wishes to thank the following for providing some information used in this article.

Arthur Gibson, nephew of Donald Gibson

Rachel Daniels, Baraboo Interlibrary Loan, Baraboo, Wisconsin

No. 1254495

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Whereas DONALD L. GIBSON,

of

Delton, Wisconsin,

HA S PRESENTED TO THE **Commissioner of Patents** A PETITION PRAYING FOR THE GRANT OF LETTERS PATENT FOR AN ALLEGED NEW AND USEFUL IMPROVEMENT IN

PARCEL-POST SCALES,

A DESCRIPTION OF WHICH INVENTION IS CONTAINED IN THE SPECIFICATION OF WHICH A COPY IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND HA S COMPLIED WITH THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED, AND

Whereas UPON DUE EXAMINATION MADE THE SAID CLAIMANT is ADJUDGED TO BE JUSTLY ENTITLED TO A PATENT UNDER THE LAW.

NOW THEREFORE THESE **Letters Patent** ARE TO GRANT UNTO THE SAID

Donald L. Gibson, his HEIRS OR ASSIGNS

FOR THE TERM OF SEVENTEEN YEARS FROM THE twenty-second DAY OF

January, ONE THOUSAND NINE HUNDRED AND eighteen,

THE EXCLUSIVE RIGHT TO MAKE, USE AND VEND THE SAID INVENTION THROUGHOUT THE UNITED STATES AND THE TERRITORIES THEREOF.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington this twenty-second day of January, in the year of our Lord one thousand nine hundred and eighteen, and of the Independence of the United States of America the one hundred and forty-second.

Commissioner of Patents.

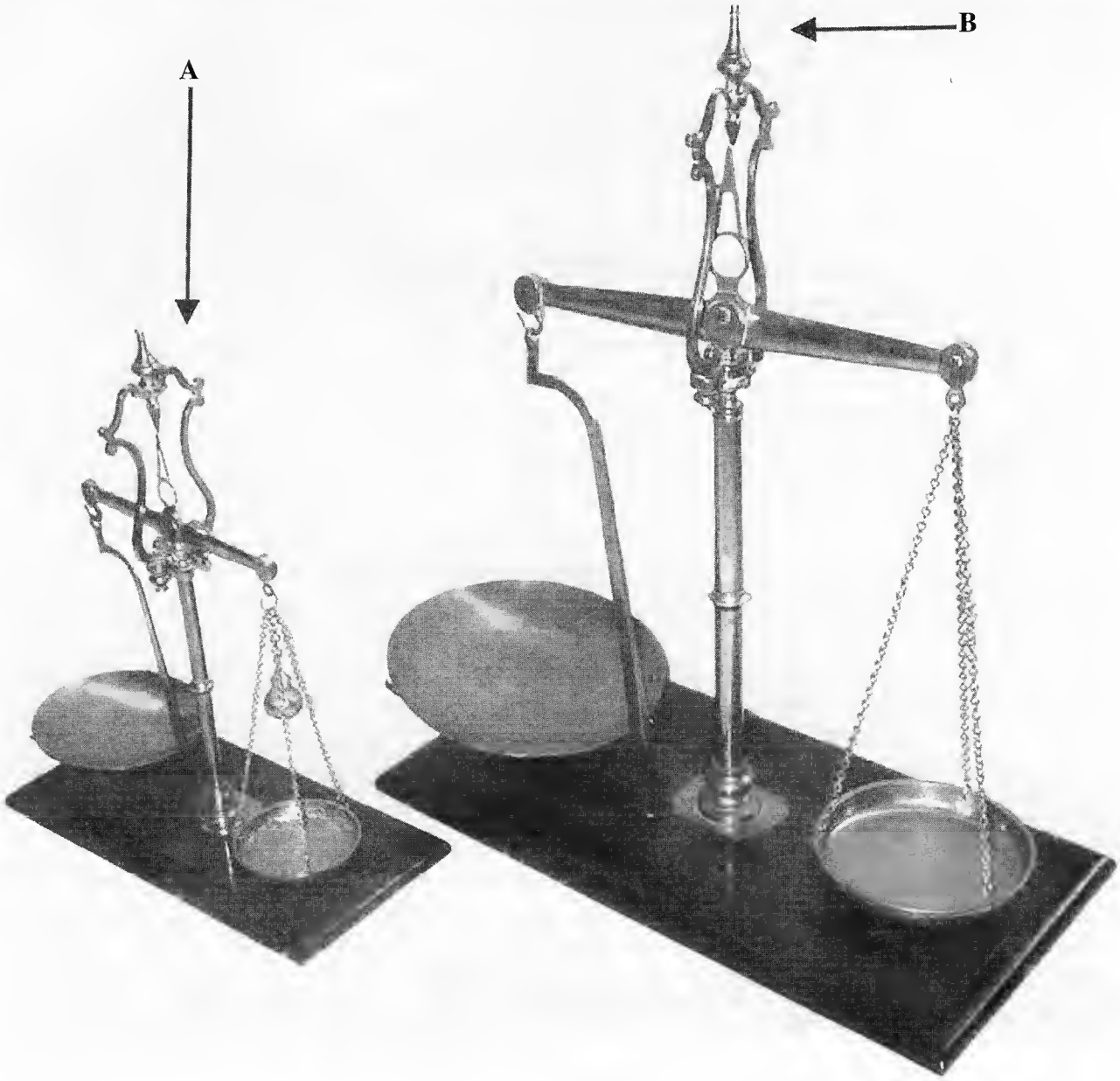
Figure 8. The pages of Gibson's Parcel Post Scale patent are bound with a royal blue ribbon. The Patent Office seal is on a red sticker and the patent number is stamped on the top right in red. Gibson had a 17 year patent.

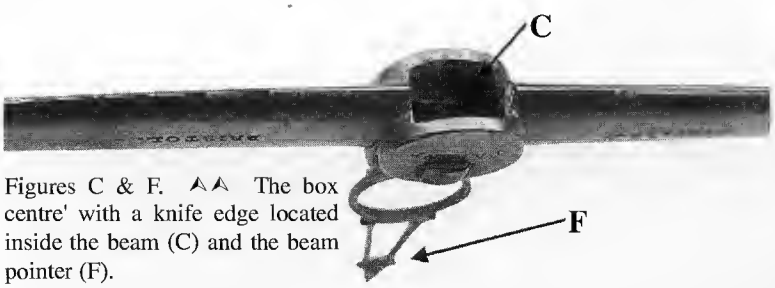
Bartlett Pairs

BY M ROBINSON & J KNIGHTS

The firm of Bartlett in Bristol, is one we know comparatively little about. As far as we know the Avery Historical Museum has only one of their catalogues, printed about 1900, which does not, unfortunately, assist us by featuring the scales under discussion in this article. This paucity of information probably stems from the fact that the business barely survived into the 20th Century before being swallowed up by Pooley, when records and material from an earlier period may well have been discarded.

Figures A & B. ⋎⋎ The smaller machine (A) is marked 'Bartlett Bristol' with the word 'Patent' but additionally has a capacity of '4oz' and 'Class 2' impressed on the beam. The larger of the two machines (B) is marked simply, 'Bartlett Newcastle' plus the word 'Patent'.





Figures C & F. ⅄⅄ The box centre' with a knife edge located inside the beam (C) and the beam pointer (F).

We do know that John Bartlett was a scale maker who learned his trade in London and then moved to Bristol in about 1831 where he set up business. The firm operated through the 19th century making various types of equipment ranging from coin scales to large steelyards. John was joined by his son in 1848, when the name changed to John Bartlett & Son. The business became a Limited company in 1890 and was taken over in 1910.

During the course of their 80-year history, they produced a number of interesting pieces of commercial equipment, which offer a welcome addition to the collection of those of us interested in 19th century trade scales.

Even less is known about the business of a similar name that operated in Newcastle-upon-Tyne in the mid- to late- 19th century. Charles Bartlett was John's younger brother and had originally been apprenticed to him in 1821. In the course of his career he went to New York where he worked for a while. He eventually returned to England, however, and travelled North; turning up in Newcastle in 1848. He operated there for a number of years and we know of patents taken out in his name in the 1880s and 90s.

A recent acquisition by Gerry Chellingworth serves to illuminate, but also add some confusion to our understanding of the Bartlett story.

The scale in question is an equal-arm scale, made of brass, clearly designed for use in a grocer's shop or similar establishment. It is a machine of most unusual design and it is particularly notable, as it is the second scale of this type that he has managed to acquire. It also raises interesting questions about the relationship between the Bartlett businesses operating in Bristol and Newcastle.

The recent acquisition is the larger of the two machines (B), which is marked simply, 'Bartlett Newcastle' plus the word 'Patent'. There is no indication of the machine's capacity, but it appears to be about 2lb. The smaller machine (A) is marked 'Bartlett Bristol' with the word 'Patent' but additionally has a capacity of '4oz' and 'Class 2' impressed on the beam. It has a lead stamping plug inserted into the beam. These features indicates that the machine was either made, or more probably, adapted, to comply with the Model Regulations of 1890. The larger machine has two rudimentary stamps consisting of a crown and the letter 'R' (presumably an imperfectly applied VR royal cipher) impressed, directly onto the brass, at either end of the beam.

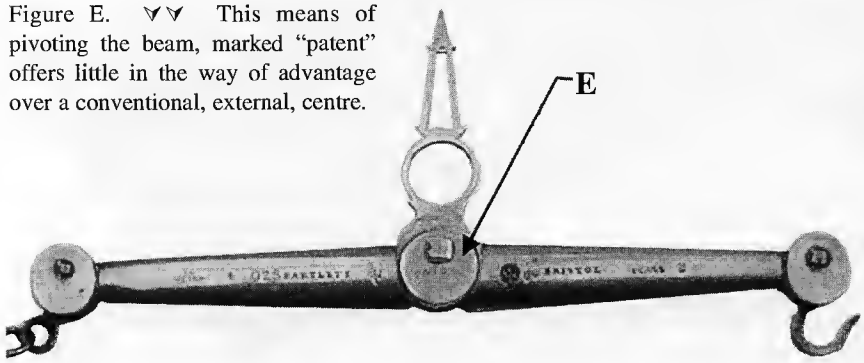
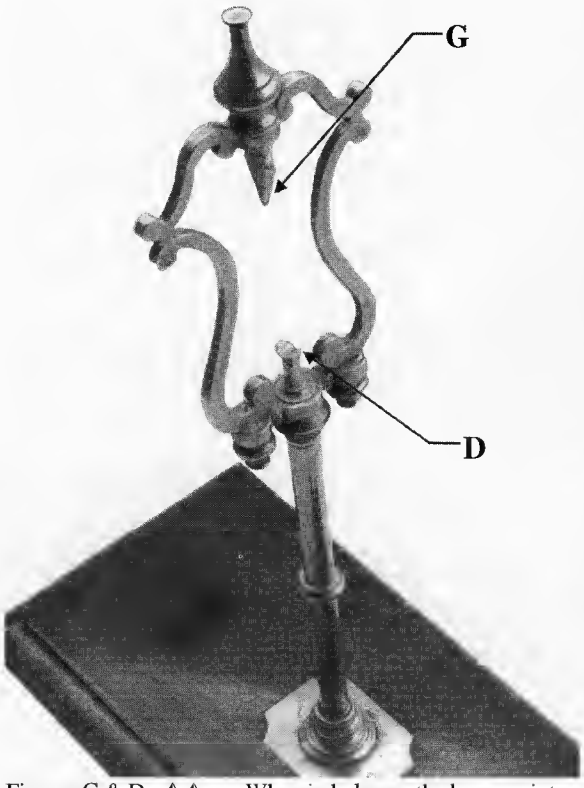


Figure E. ⅄⅄ This means of pivoting the beam, marked "patent" offers little in the way of advantage over a conventional, external, centre.

When fully assembled these



Figures G & D. ⩓⩓ When in balance, the beam pointer (F) is in front of top datum (G), rather than coinciding with it as might reasonably be expected. It is not clear whether this is a deliberate feature or fault in the design. The bearing (D) is a little 'U' shaped affair mounted on a brass pillar

scales do not look particularly remarkable, or distinguishable from others of the mid- to late- 19th Century. The mahogany base, brass pillar and harp top look comparatively commonplace. The box end bearings do look a little old fashioned on equipment, which was apparently, still being marketed in the 1890s. It is probable however that the design is from an earlier period (despite the Art Deco form of the pointer F) and the failure to update could be put down to provincial conservatism.

Closer examination reveals, however, that the scales have no suspended gallows and that the centre sits upon a fixed bearing. Whilst this mode of construction is not uncommon, it seems strange to find it in a quality trade beam as the machine is rendered sensitive to level by this omission. When the beam is removed, however, it becomes apparent that not only does it have box ends, but also a 'box centre' with a knife edge located inside the beam, which is expanded at this point to accommodate it (C). The bearing is a little 'U' shaped affair mounted on a brass pillar (D), although this is invisible when the beam is dropped into place. This type of central fulcrum is uncommon, to say the least, and I would doubt whether many of us have previously come across such a feature in a piece of equipment of this type.

Despite the fact that the design is allegedly, the subject of a patent (E), this means of pivoting the beam offers little in the way of advantage over a conventional, external, centre, and it has to be wondered why it was used.

The short internal knife-edge would be prone to accelerated wear, compared to an external one, because of the concentration of the load over a short length. As already mentioned the scale would require levelling for accuratc use, and is not equipped with levelling feet or spirit level. When in balance, the beam pointer (F) is in front of top datum (G), rather than coinciding with it as might reasonably be expected. It is not clear whether this is a deliberate feature or fault in the design.

The beam has a nasty tendency to slew within the U shaped centre bearing which appears insufficiently deep to properly accommodate the knife-edge. The bearing itself is apparently made wholly of brass in the small instrument, and whilst there is evidence of a harder metal insert on the larger scale it must be seen as an odd and technically unsatisfactory fulcrum for a trade machine.

The only obvious advantage of this design would be that all three pivots are protected from the ingress of dirt, dust, grease etc and this may have been of some merit in a commercial environment, such as a grocery shop.

It has been assumed that the two Bartlett businesses were operated as totally separate enterprises. Indeed, as they were situated so far apart, it is difficult to see how it could be otherwise. We see here, however, examples of machines, almost certainly made in the same place being offered at different ends of the Country, suggesting, at least, some degree of co-operation between the two firms.

So unusual is this mechanism that it probably rates as a failed design which would account for the fact that not many have been seen. It also has to be wondered why it was seen fit to send such a flawed product so far afield. It could have, perhaps, been a case of one brother off-loading some dubious product onto an unsuspecting sibling.

Perhaps we will never know, but these finds certainly raise speculation about the relationship between the Bartlett businesses as well as suspicion about some of the 'Patent' claims that were made in those times.

To the collector, of course, it is often the design failures; that appeal most, because of their quirkiness and rarity.

Gerry is to be congratulated on acquiring not one, but two of these interesting scales.

Notes:

We are of course deeply indebted to our Information Officer, for such information as is currently available about the Bartletts of Bristol and Newcastle.

Showcase

Figure 1 ≺≺ This scoop scale is marked "Pat Appl'd For, B & H Scoop Scale Co., Made by C G & M Co., Anniston, Ala." It has an aluminum scoop and a machined stainless steel handle. It measures 13 1/2" long, the scoop is 5 3/4" in diameter and its capacity is 5pounds by 1/4 pound. Unlike most scoop scales which are used horizontally, this scale weighs in a vertical position as shown. This scoop scale most resembles US Patent number 1,787,352 awarded to James M. Bensinger of Gadsden, Alabama on December 30, 1930. The patent drawing shows a latch on the shaft to be used to protect the spring. Collection GA Wehman.

Figure 2 ≻≻ This scoop scale is marked "DOLLYDALE Pat. No. 2497271The Robson Corporation, New York City". The patent was issued to Charles Peckham of New York, NY and assigned to the Robson Corporation, on February 14, 1950. It measures 16" long, the scoop is 7 3/4" in diameter and it has a 5 pound capacity. Collection GA Wehman.

Here's the Straight Scoop?

BY J R KATZ

I call your attention to the only EQM article written on American weighing scoops, by Thomas (Todd) Carley, long deceased *(EQM pages 487 - 492)*.

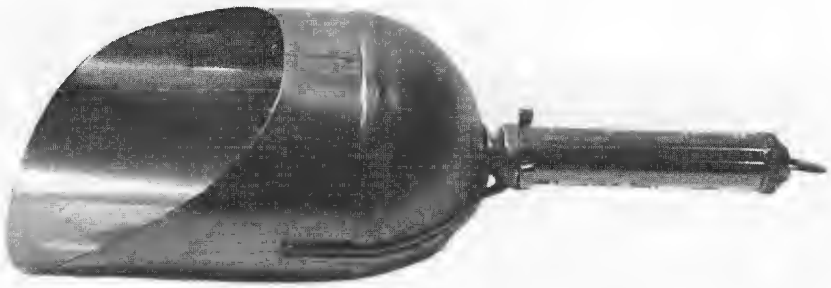


Fig. 1. ⩓⩓ Gilfillan's scoop scale is constructed of brass. It measures 12" long and the scoop is 4" in diameter.

Conspicuous by its absence from Carley's list of patented weighing scoops is the one shown here by our good friend Gilfillan. It probably did not make Carley's list because, as it is so stamped, "Pat Apl'd For". It is indeed very much like the one shown in EQM, pg 491, Fig 10, the noticeable difference in the two being the tubular spring retaining clamp. Summarily, if I were a patent examiner, it would be difficult for me to grant Mr. Gilfillan a patent. There needed to be something more to it, but....

Except for the "Wayscoop" the others in Carley's article are discussed using only their patent drawings. Could it be that outside the Wayscoop these scales are not that common? Otherwise why would Carley not have used other photos, a much nicer touch than merely drawings. Perhaps so.

The weighing scoop shown here is marked, "WEIGHS 2 LBS BY OZS/GILFILLAN SCALE & HDW CO/CHICAGO/PAT APL'D FOR". For those of us engaged in separate Gilfillan research I think it safe to say that the above name was used before Gilfillan gave way to Pelouze which would have been very late 19th century, perhaps early 20th century. This scale is essentially as new, almost as though it was purchased and then stored for 100 years.

Now you have the straight scoop.

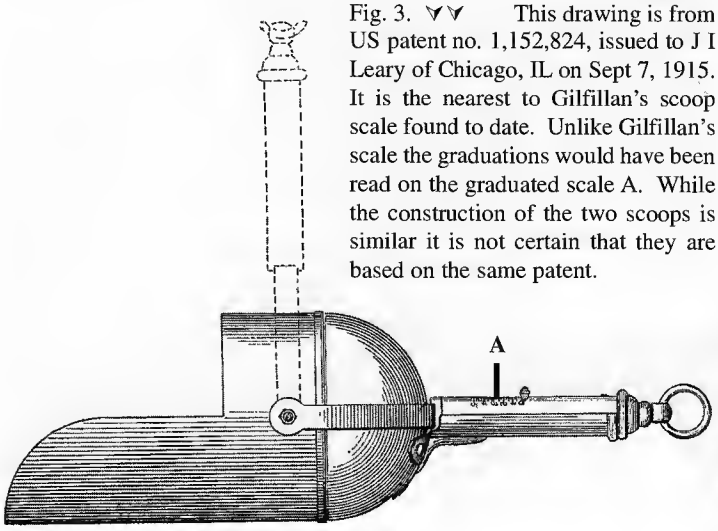


Fig. 3. ⩔⩔ This drawing is from US patent no. 1,152,824, issued to J I Leary of Chicago, IL on Sept 7, 1915. It is the nearest to Gilfillan's scoop scale found to date. Unlike Gilfillan's scale the graduations would have been read on the graduated scale A. While the construction of the two scoops is similar it is not certain that they are based on the same patent.

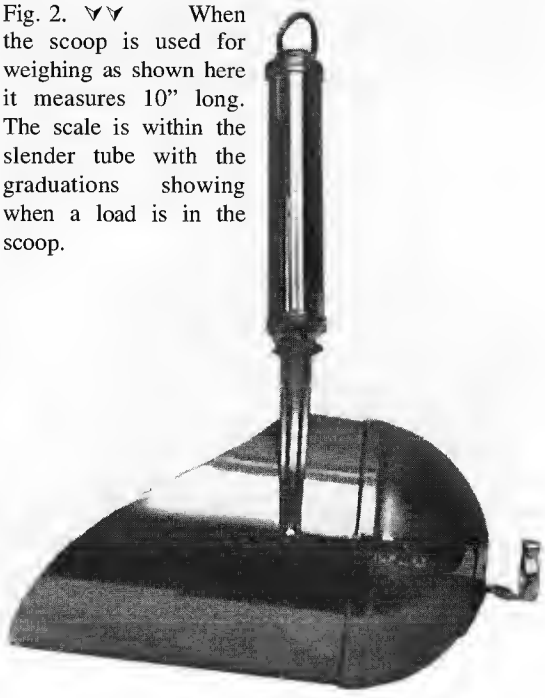


Fig. 2. ⩔⩔ When the scoop is used for weighing as shown here it measures 10" long. The scale is within the slender tube with the graduations showing when a load is in the scoop.

1869	Sep 21	94974	Priest & Howard	Spring scale.
1879	Mar 4	212786	J Birks	Weighing-scoop.
1881	Jul 19	244449	H Fine	Self weighing scoop.
1883	Jan 30	271210	I L Bevis	Scoop scale.
1883	Mar 13	273979	J & H Friedlander	Weighing scoop.
1886	Feb 3	336641	D Hallock	Multifulcrum scoop scale.
1889	Oct 1	412049	E Side	Automatic weighing scoop.
1890	Feb 11	421221	Zwiesler & Menchen	Weighing & measuring scoop
1896	Oct 27	570434	C A Johnson	Weighing scoop.
1897	Mar 9	578642	D R Joslyn	Weighing scoop.
1897	Sep 21	590361	C D Colley	Weighing scoop.
1898	Feb 1	598406	J M Withrow	Weighing scoop.
1898	Jul 19	607578	G H Watkins	Weighing scoop.
1899	Feb 7	618893	W J Miller	Combination scoop & scale.
1903	Jul 28	734653	J S Alexander	Weighing scoop.
1904	Mar 29	755966	J L Taylor	Combined scoop & weighing apparatus.
1905	Feb 7	781920	J L Taylor	Weighing scoop.
1905	Mar 14	784641	J L Taylor	Weighing scoop
1905	Dec 12	807334	A L Swank	Automatic weighing scoop.
1906	Aug 28	829704	B D Emanuel	Automatic weighing scoop.
1907	Dec 3	872961	P Neddo	Scoop.
1909	Mar 23	916251	A H Arnold	Self weighing scoop.
1909	Sep 7	933608	Q B Wright	Weighing device.
1910	Dec 6	977668	J W McConeghy	Weighing scoop.
1911	Feb 7	983554	F A W Kelley	Balance scoop scale.
1912	Feb 6	1016246	Ault & Switalski	Automatic Weighing scoop.
1912	Aug 6	1034486	Monmonier & Morehead	Self weighing scoop.
1913	Aug 15	1058713	P E Bertram	Self weighing scoop.
1914	Nov 10	1116727	J A Pickens	Weighing scoop.
1919	Sep 23	1317147	F W Barnaclo	Weighing scoop.
1924	Jul 22	1502181	H Fine	Self weighing scoop
1925	Jan 6	1521750	A L Busse	Weighing scoop.
1925	Jan 6	1522316	C Nauck	Weighing scoop.
1927	Mar 8	1620000	E R Ball	Scoop scale.
1933	Jun 16	1913296	R F Shipman	Weighing Scoop.
1940	Apr 9	2196280	J C L Thornhill	Scoop scale.
1944	Nov 21	2363366	T R Schreiner	Weighing & handling device.
1945	Oct 9	2386637	R F Shipman	Weighing scoop.
1950	Feb 14	2497271	C Peckham	Weighing scoop.
1950	Nov 28	2531575	M S Martin	Weighing scoop.
1954	Jan 12	2665898	P F Campbell	Coffee weighing device.

Kirkoswold Weight of 1662

BY A CRAWFORTH

When I was offered a 14lb avoirdupois bronze bell weight engraved with a coat of arms and Kirkoswold at a recent antique fair my heart skipped a beat, but why? Apart from the alluring early date, 1662, the name rang a faint bell. After spending several, mostly fruitless hours on the internet trying to identify the coat of arms I capitulated and rang my mother, hoping she might be able to look up Kirkoswold in some obscure reference book. She answered, straight off the cuff, "*It's the Dacre family arms. There's an article about a measure with those arms in an early issue of the Antique Metalware Society Journal*".

Fig. 1. ⮜⮜ The 14lb avoirdupois bell weight, 163mm high. The base is 124mm across. Later bell weights were taller, with the base less splayed out, and the bottom edge starting to curve under from higher up the sides.

As usual, she was correct; I went back to the Journal, and found a photograph of the half-bushel from the same set as my weight. Finlay's text concerns only bushel measures, not weights, but it was interesting to note that, in 1667, *"Wee the Jurors of Kirkeoswold ... doe Order and put in paine: that all those that Keepe pecks to buy or sell withall within the Markett Towne of Kirkeoswold shall come to the Bailliffe and to two of the ffreemen of the Jury of Kirkeoswold to gitt their pecks sealled according to the said Measure and Brasse Standard Remaining in the Bayliffes Custody before the 15th day of May 1667. And If any person or persons shall keepe any bushel peck or other Measure whatsoever to buy or sell withall after the 15th day of May 1667 not agreeing with the Standard That such person or persons soe offending shallbe Amercyed and fforffeit to the Lord of the Manner for every offence vis viiid."* If the Jury were checking on the traders' measures, it is certain that they were checking equally on their weights, using the same set of Standards, and fining the cheats similar huge sums for using false weights. The set was kept securely by the Bailiff, but the fines went to the Lord of the Manor.

Finlay had also researched the armorial on his half-bushel (and on my weight), a shield containing three scallop shells

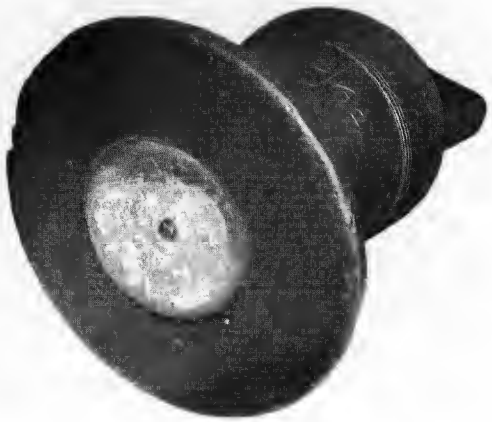


Fig. 2. ➢➢ The bronze stub protrudes 5 mm from the dished hollow turned in the base of the weight. The surrounding lead is held in more securely by having the stub. The lead was put in a surprisingly short time after manufacture, when it was stamped with crowned I, during the reign of James II, 1685 to 1688. The big stamp in the lead is so abraded that it can no longer be identified, all that is visible being a rectangular indentation with a zig-zag edge.

(gules three escallops argent) and discovered that in 1662 it belonged to Thomas Lennard, the 5th Lord Dacre, who was Lord of the Manor of Kirkoswold, and thus the recipient of those fines. Now I had the family name, I could return to the internet and my reference books to find out a little more. Time for a little background history; Alexander de Dacre was a crusader knight in the 12th century. The family home, Dacre Castle, had a license to crenellate granted to William de Dacre in 1307. However the building was not strictly a castle, even with its seven-feet thick walls, 66 feet high, and its crenellations. It was a pele tower, a fortified home, its function not primarily strategic, but rather to protect the residents from marauding Scotsmen, crossing the border 22 miles north, into Cumberland, in sporadic raids right up to the 17th century.

Fig. 3. ⩓⩓ The engraving shows 'Kirkoswold' over the arms of Dacre with 1662.

The family's fortunes went up and down according to Royal favour, but the family did gradually increase in power and influence. Thomas Lennard matriculated at Oxford University at the age of 13, when he described himself as '*Baron Dacre Castell in the North*'. He was favoured by the royal family, as he married the Duchess of Cumberland, the legitimate daughter of King Charles II. He was created Earl of Sussex in 1674; (Royal connections were useful in those days). Thomas obviously felt secure in his 'castell' and he made many improvements including much larger windows to replace the arrow slits.


Fig. 4. ⩓⩓ The shoulders of the weight showing, top left, Victorian stamp of Westmoreland, middle left, crowned CR and a crown beneath it punched by a different hand, and bottom left, the chequer-board of the Exchequer. Top right, the chequer-board again, and middle right, the crowned CR with the crown beneath it punched by a different hand. [The chequer-board was used as the symbol of the Exchequer because the board was the object used by the accountants in the Exchequer to place their jetons (counters) while they added up their sums.]

In 1660 new legislation was brought in requiring sets of Standards to be provided in all regions of England and Wales, after the restoration of the monarchy. Thomas, Lord Dacre, would have been the ideal person, with authority as Lord of the Manor, to order local Standards in 1662, presumably from a London maker. These would have been paid for by Lord Dacre and would therefore quite rightly have been engraved with his personal arms. The weight was engraved Kirkoswold (now Kirkoswald) as it was the custom for all local Standards to be marked with the place for which they were required. Local Standards were those weights and measures which had been checked against the Standards held in the Exchequer, at Westminster in London, and stamped with their mark of the chequer-board. The weight is also stamped with a crowned CR,

the royal cipher of the reigning monarch at the time of manufacture of the weight, Charles II (who also happened to be Thomas' father-in-law). A further large and very handsome crown is stamped below CR, but, due to the paucity of evidence from this period, its significance is not understood.

Fig. 5. ⩓⩓ The marks are very lightly punched in, and consequently difficult to see accurately. The black areas are parts that are reasonably visible, and the grey areas are rather indistinct, and may be wrongly interpreted.

The weight is also stamped with a much later mark of a castle over VR over an E, showing that the weight was still in use in Victorian times in the East division of the neighbouring Westmoreland County, no longer as a Standard but as a trade weight. (It does not bear a 14lb mark, as regulations requiring the denomination were only brought in during the 19th century.)

This local Standard would have been used to test against the working Standards used by the Jury in the market at Kirkoswold under the authority of Lord Dacre, perhaps until his death in 1715, or until the weights were superseded.

Did Lord Dacre ever handle this weight? I would like to think he might have. Under normal circumstances, it would have been used by the Bailiff of Kirkoswold with Lord Dacre's authority. On December 11, 1688, Lord Dacre was co-signatory of a document which endeavoured to support the new King, William III, to "*procure a free parliament*" and offering to assist "*...His Highness in the obtaining [of] such a parliament with all speed, wherein our laws, our liberties and properties may be secured.*" He signed as Thomas Lennard, Earl of Sussex. Of course, he was also protecting his family's rights to the market tolls of Kirkoswold!

Notes & References

Brabner, J H F, *Comprehensive Gazetteer of England and Wales*, c.1892.

Stretton, E H A, *Dacre Castle, a short history of the Castle and the Dacre family*, 1994, ISBN 186 9019.

Finlay, M, Some North-Country Bushel Measures and their Use, *Antique Metalware Society Journal*, Vol. 3, (1995).

Beddard, R, Declaration of the Lords Spiritual and Temporal, December 11, 1688, *A Kingdom without a King, The Journal of the Provisional Government in the Revolution of 1688*, Oxford, 1988.

For a good picture of Dacre Castle, see www.visitcumbria.com

Ricketts, C & Douglas, J, *Marks & Marking of Weights and Measures of the British Isles*, self-published, 1994. ISBN 0 9528533 0 2.

Connor, R D, *The Weights and Measures of England*, Science Museum, London, 1987, ISBN 0 11 290435 1. Connor notes that Elizabethan Standard Weights, made in 1588, cost £9..8s..9d per set, without any measures. So what would have been the cost of Kirkoswald's set, with their additional bronze bushel, half-bushel, peck, ale gallon and wine gallon, quart, pint and gill, and quite possibly, their ell and yard? Connor draws attention to the intention by the 2nd Carisfort Committee of 1759 to remove the Avoirdupois pound as a Standard, in favour of the Troy pound.

Fig. 6. ⩓⩓ The bronze half-bushell measure that was made for the same set. It is extraordinary that not only has this measure survived, but the whole bushell measure has also survived, and one of the small flat round weights.

Finlay, M, Some North-Country Bushel Measures and their Use, *Antique Metalware Society Journal*, Vol. 3, (1995). I am very grateful to Michael Finlay for permission to reprint a picture from his article.

US Patents, 1890

Many scale patents for this year were issued for coin-operated scales.

Patents sorted by date, (shop/warehouse platform scales and smaller). 1890

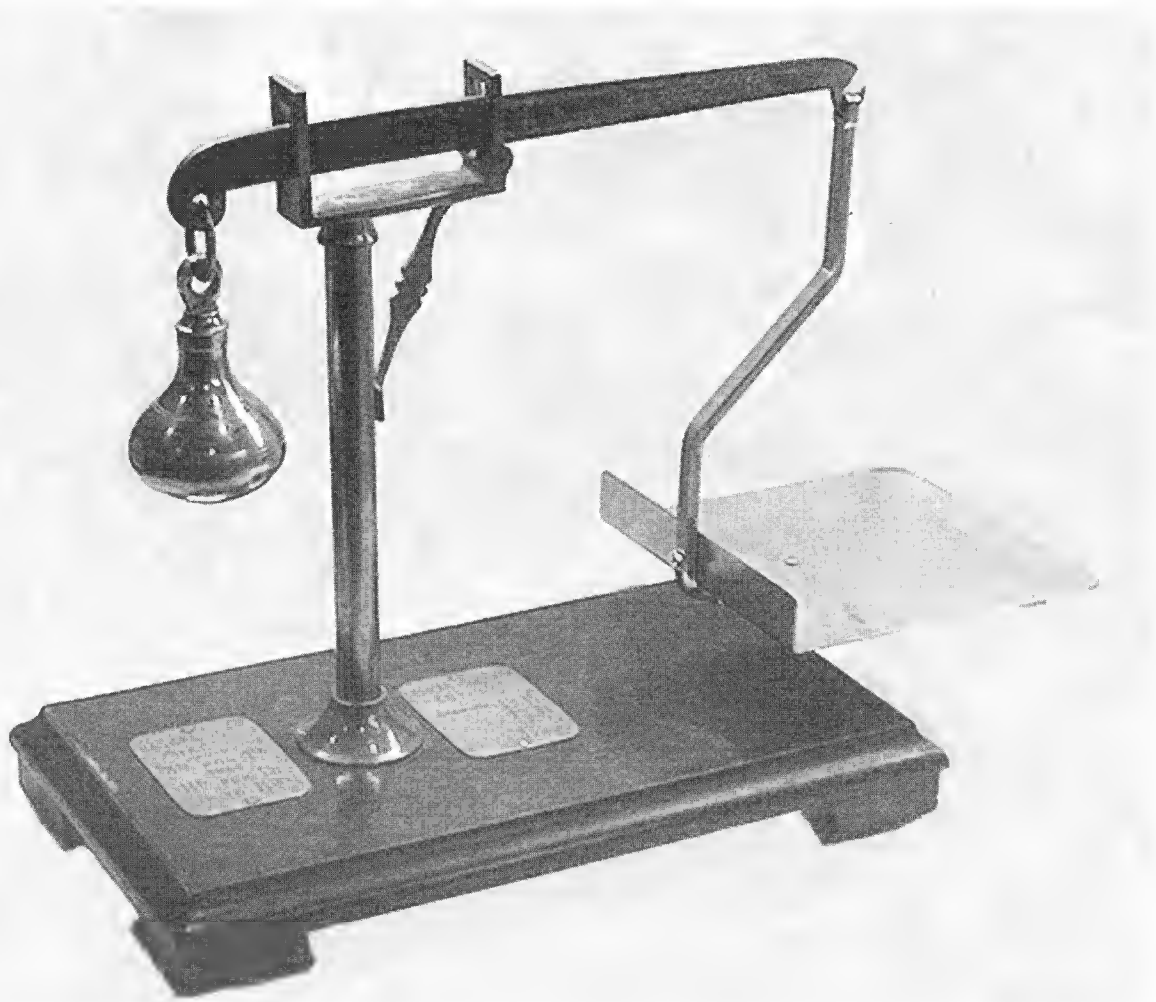
NO.	DATE	INVENTOR	RESIDENCE	ASSIGNEE	TYPE
418,708	Jan 7, 1890	C H Fitch	Middletown Springs, VT		Pocket prescription scale
418,822	Jan 7, 1890	WR Smith & AL Washburn	NY, NY & Niantic, CT	The Standard . Automatic Scale Co	Coin controlled scale
419,544	Jan 14, 1890	JM O'Kelley	New York, NY	1/2 to Bayaud	Coin lock for coin-op scale
421,026	Feb 11, 1890	JC Bittschofsky	Cleveland, OH		Postal Scales
421,221	Feb 11, 1890	LZwiesler & J Menchen	Kansas City, MO		Weighing scoop
421,695	Feb 18, 1890	RE Glover	Granger, MO		Drug scale
421,805	Feb 18, 1890	CM Babcock	Garrattsville, NY		Computing spring scale
422,230	Feb 25, 1890	FJ & JH Lancaster	New York, NY	National Weighing Mach Co.	Coin controlled scale
422,238	Feb 25, 1890	CG Lundborg	New York, NY		Double spring cylindrical scale
422,876	Mar 4, 1890	JF Bower	Chicago, IL	OD Orvis	Coin op scale & strength tester
423,123	Mar 11, 1890	JG Schmidt	Philadelphia, PA	H Troemner	Cased balance scale
424,770	Apr 1, 1890	AH Fancher	Brooklyn, NY		Coin released scale
425,271	Apr 8, 1890	HW Thurston	Brooklyn, NY	EN Downs	Hand truck scale combination
426,818	Apr 29, 1890	TW Jeffries	Sydney, N S Wales		Plate attachment for scales
427,829	May 13, 1890	JT Bright	Lexington, KY		Computing counter scale
428,560	May 20, 1890	HC Hart	Detroit, MI		Computing counter scale
429,477	June 3, 1890	IL Purdy	Macedon, NY	HH Purdy	Scale beam & poise
431,205	Jul 1, 1890	EN Gilfillan	Chicago, IL	1/2 to W H & LE Dodge	External spring scale
431,456	Jul 1, 1890	JH Freeman, Jr	Howard, CO		Vertical barrel computing scale
432,597	Jul 22, 1890	JN Brown	Farwell, MI	1/2 to FF Presley	Hand truck scale combination
436,427	Sep 16, 1890	NB Marston	Lebanon, NH		Combined hay fork & scale
436,835	Sep 23, 1890	JB Martin	Cincinnati, OH		Quadrant pendulum scale
437,166	Sep 23, 1890	WR Smith	New York, NY	Standard Automatic Scale Co.	Coin controlled scale
437,379	Sep 30, 1890	AJ Gaston	Beloit, WI		Pivioting hanging steelyard & pan
437,899	Oct 7, 1890	Buschmann & Van Alstine	Paterson, NJ		Liquid weighing scale
438,753	Oct 21, 1890	M Phelps	Red Oak, IA		Computing platform scale
439,216	Oct 28, 1890	CB Wanamaker	Indianapolis, IN	Wanamaker Car Sc Co.	Wear free bearings for scales
440,579	Nov 11, 1890	GA Skinner	Rochester, NY		Scale with tilting beam
440,728	Nov 18, 1890	WR Smith	New York, NY	Standard Automatic controlled scale	Coin controlled scale
440,959	Nov 18, 1890	PA O'Marra	Kingston, NY		Paper scale & desk ruler
441,451	Nov 25, 1890	HW Thurston	Brooklyn, NY	EN Downs	Hand truck scale combination
441,711	Dec 2, 1890	WR Smith	New York, NY	Standard Automatic. Scale Co	Coin controlled scale
442,218	Dec 9, 1890	RA Daniels	Minneapolis, MN		Computing platform scale
442,537	Dec 9, 1890	AP O'Brien	Richmond, VA	1/2 to AD Ledoux	Bag weighing scale
442,873	Dec 16, 1890	CA Fairand	Watertown, NY		Computing hanging spring balance

ISASC

EQUILIBRIUM®

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

2004 ISSUE NO. 3 PAGES 2929 - 2956



Cover Picture

This bismar scale was patented by S. W. Suffield on July 13, 1889. It was manufactured by Samuel Turner, Senior whose trade mark STS is stamped into the beam.

This interesting parcel scale by Samuel Turner Senior is made of brass with an iron beam and brass poise. It measures 10cm high by 6cm wide and the beam is 29cm long. The brass letter tray measures 16 by 16cm.

The scale is mounted on a nicely finished, four-footed hard wood base. Attached to the base are two 7.5 by 5.5 centimeter brass postal rate plaques. The rates are for the period 1886 to 1897.

Contents

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Goat Milk Balance & Some Fishy Work

BY JENNY HUTCHINSON

George Gascoigne started his dairy equipment company in Reading in 1923, and registered his trademark name in July 1946. At that time, Reading's industries were frequently described as being "beer, biscuits and bacon" - there have to be worse combinations! The town has always had close links with the agricultural industry and its training; the University has an Institute of Agricultural Research and the Rural History Centre is based there.

Fig. 1. AA The Gascoigne Goat Milk Balance

There seems little reason why the weighing of goats' milk should require a dedicated balance; in Britain, milk yields for goats are traditionally recorded by weight rather than volume, as goat herds here are generally small, and usually milked by hand as opposed to the milking parlours and machine-milking favoured for the larger herds of dairy cattle. The goat owner simply requires a balance with a weight range of approximately 0 -15lb and a tare screw able to be adjusted to accommodate the weight of an appropriate bucket (usually about 7lb). Therefore, it seems reasonable to assume that this little balance was produced and labeled just to make the goat owner feel special and not left out of things. (See Fig. 1.)

However, if whilst thinking of all those happy goat owners with their specially designed, patented balances, you have been suffused by a warm glow - beware! Below the surface, all is not what it claims to be!

Gascoigne's were not scale manufacturers, and therefore simply bought the required balances from the nearest convenient source, which happened to be the Precision Engineering Company of Reading, makers of the "Waymaster" scale range. Even though they bought in their balances, Gascoigne's had a strong line in advertisements. *The Balances and Pig Weighers are made of the finest material possible, selected to withstand the stresses and strains of a long and useful Farm Life. All calibrations are clearly printed and tare adjustments can be made in a couple of seconds.* The Precision Engineering Company really made cheap spring balances, frequently with cases made from Mazak, a very brittle zinc alloy popular during the 1940s and 50s for castings such as car door handles etc. Their range also included household and postal scales. The Precision Engineering Company was founded in 1941, and at the end of 1990, changed its name to Waymaster. In October 1993, it was taken over by Kenwood Appliances. This particular milk balance possesses the general Waymaster characteristics mentioned above; the case is made from zinc alloy, and the face is white-painted steel. (See Figs. 1 & 2) The illustration, taken from a 1960 catalogue, shows that the cost of the balance was £2..12s..6d.

3. GOAT BALANCES

This is a special Goat Milk Recording Balance, incorporating the features of the Cow Milk Recording Balance, but is calibrated in lbs. and ozs. to a maximum of 15 lbs. 6½" size diameter only. Tare adjustment screw ensures absolute accuracy.

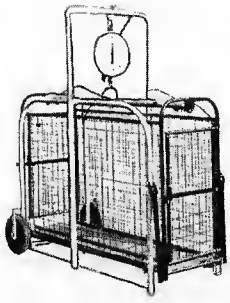
4. TUBULAR STEEL TRIPOD

This is of robust construction for milk recording under farming conditions. Exclusively designed for suspension of both Goat and Cow Milk Recording Balances. It can be folded after use for safety and ease of storage.

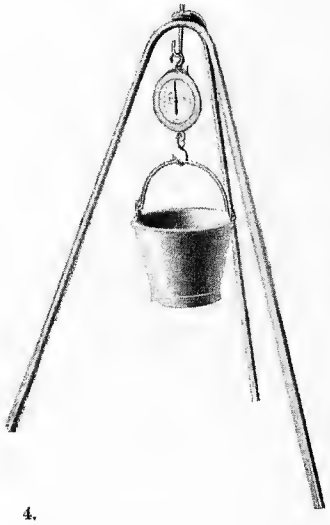
3.

Fig. 2. ⋏⋎ Gascoigne's Catalogue of 1960

Gascoigne Pig Weigher Mk. II



Quick, accurate and steady, will weigh 50 Pigs or Sheep an hour. Scale gives both "live" and "dead" weights. Strong durable construction for long farm life.



4.

PRICES

Milk Recording Balance, 6½" dia.	**-**	**£2 10s.**	**6d.**
10" dia.	**-**	**£5 2s.**	**6d.**
Live/Dead Weight Pig Scale	**- -**	**£7 17s.**	**6d.**
Goat Balances, 6½" dia.	**- - -**	**£2 12s.**	**6d.**
Tubular Tripod	**- - - - -**	**£2 2s.**	**0d.**
Gascoigne Pig Weigher Mark II	**-**	**£39 7s.**	**6d.**

Fig. 3. ⋏⋏ Price list of 1960.

Although it is difficult to date this particular example accurately, it seems reasonable to assume that its date falls somewhere between 1941, when the patent no.5991569 (which is printed on the front of this balance, see Fig. 4) was granted to Alfred Brown and the Precision Engineering Company, and 1974, when Gascoigne's merged with Melotte, a Belgian company who also made dairy equipment. Two of the patent drawings are shown in Fig. 5.

The patent specification for the goat milk balance states: *An object of the present invention is to minimise the frictional losses.* [According to this invention], *a weighing machine comprises... a casing 11, (Figures 1 and 2), of rectangular form, fitted with aligned bearings 12 and 13 on its upper and lower sides. In the bearings are slidably-mounted two spindles 14 and 15, formed on or attached to opposite ends of an oblong rectangular frame 16 arranged within the casing. The frame is thus slidably mounted in the bearings ..... The spindle 15 is fitted with a ball cage 19, and this cage may move axially along with the spindle in its bearing 13 ... thereby reducing friction to a minimum. The upper bearing 12 is similarly fitted with a cage, grooves and spring rings (not shown) for the spindle. The bearing 13 in the casing may have a dashpot, shock absorber or the like for stabilising the movements of the frame. The scale pan 22 on the spindle 14 may be omitted and the end of the spindle 15 may be arranged to project through the lower side of the casing, Figure 4, and a hook 29 attached to the projecting portion ...By means of the invention a simplified and accurate weighing machine is provided.*

Fig. 4. ⋏⋏ Face of the Goat Milk Balance, showing the Patent No. 599156.

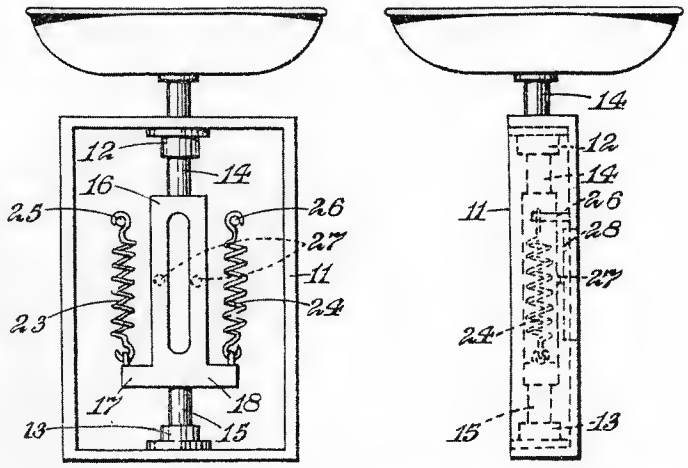


Fig. 5. ⋏⋏ Patent 599,156 drawings, Figs. 1 & 2, of 1941

The patentee's aim, therefore, was to make a very smoothly operating spring balance, using a ball bearing mechanism top and bottom to control longitudinal movement. No doubt Precision Engineering set out with the best of intentions, but presumably the sheer cost of producing the balances proved to be prohibitive, and the photograph of the workings of this goat milk balance (see Fig. 6) shows what was actually produced; a very ordinary circular spring balance, with no ball bearings, no ball race, no smoothly operating mechanism, certainly no dashpot, and just a common or garden steel plate and set screw to keep the leg in place! It can only be assumed that they thought no one would know what the mechanism was supposed to be like - after all, how many prospective customers consult the details of the relevant patent before purchasing a small, cheap item of equipment?

All this leads us to only one conclusion - we can't believe what we read on anything - even if it is in black and white!

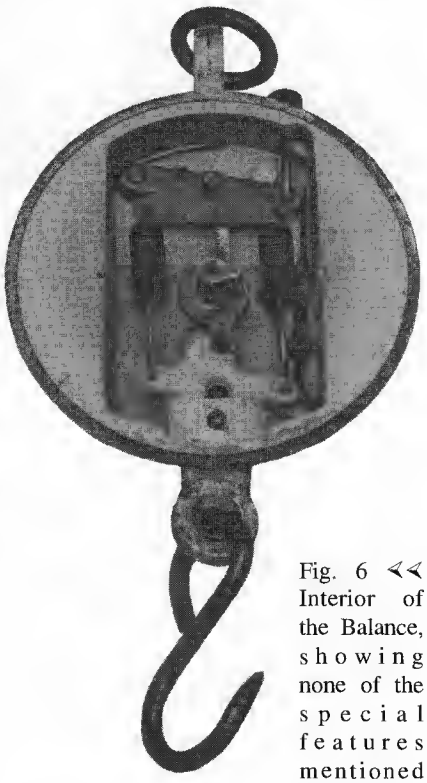


Fig. 6 ≺≺ Interior of the Balance, showing none of the special features mentioned in the patent.

Author's Biography

After studying music, Jenny Hutchinson taught in Upper schools and Further Education Colleges, directing examination courses and performances. Her interest in old shop equipment and implements expanded 12 years ago when her husband, Barrie, purchased a 1955 Austin A30 delivery van to restore. The purchase and restoration of a derelict farm scale soon after started the collection of mainly shop and agricultural scales, weights, steelyards, etc. They now have two vintage commercial vehicles, a tractor, stationary engines and old agricultural equipment, and are regular exhibitors at vintage working events. The transformation from classical musician to heavy metal freak has been successfully effected.

Acknowledgements:

I should like to acknowledge the help given to me by:

Zoe Watson, of the Rural History Centre, Reading,

David Cliffe, of Reading Library, Ruth Goodwin of the British Goat Society

Diana Crawforth-Hitchins

To What End?

BY JERRY WILSON

I am interested in assay balances and have several in my collection. Some are calibrated for an accuracy that boggles my mind. For example, I have two, one by Ainsworth and Sons, one by the Denver Balance Company, that take a one half milligram beam rider. The rider's weight is transferred to the weight pan by moving this tiny weight on the beam, which is calibrated to divide it into fifty parts! That's one fiftieth of one half of one thousandth of a gram per beam subdivision, or 0.00001 grams! Amazingly this tiny amount of weight will actually deflect the beam.

Fig. 1 ⮝⮝ Full view, William Ainsworth & Sons portable assay balance, circa 1916. The scale capacity is only two grams but it's accuracy is 1/200th of a milligram. The beam can be locked in place in an elevated position to protect the agate bearings for easy portability.

Now, I understand why such accuracy is desirable in the assaying industry, where one is trying to determine how much gold is in a ton of gold ore by extrapolating from the tiny amount of gold found in a very small sample of that ore, but...it would seem to me that little purpose is served by this accuracy in the scale if similar accuracy is not obtained in every step of the refining and measuring process.

My knowledge of analytic chemistry has never been much, and attenuated by the many years since college studies; forget it! I'll assume the chemical analysis process the assayer uses is of a quality suitable for the accuracy of the sample taking process, but what about the larger weights he uses in the weight pan? Are they of a quality to match the weighing capabilities of the beam? If not, for what reason is the beam so accurate? Can anyone help me?

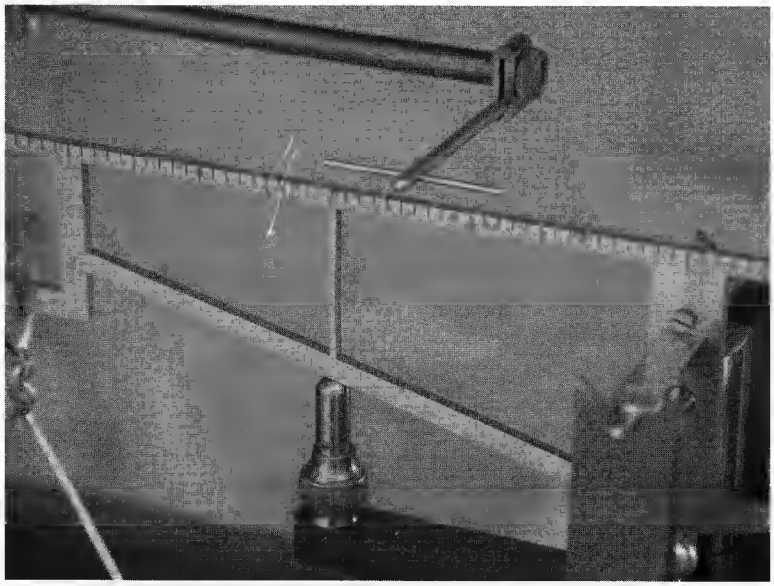


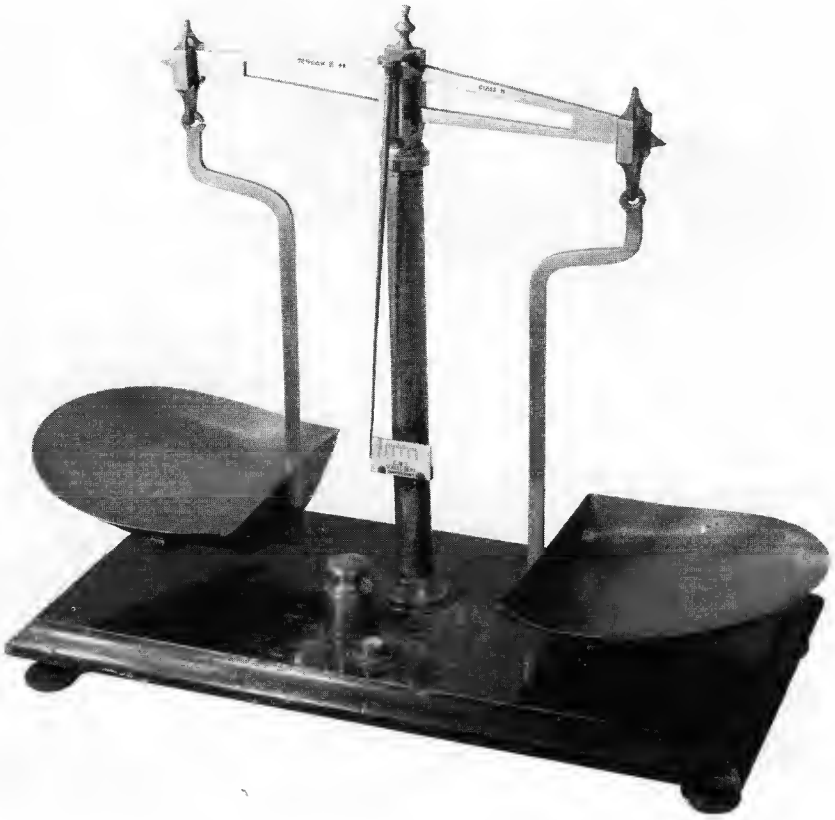
Figure 2 ➢➢ The rider's weight is transferred to the weight pan by moving this tiny wire rider on the beam.

Corrections & Clarification

BY JOHN LOUND

The scale shown was not made for - but by - the CWS Scales department, who manufactured a very comprehensive and competitive range of weighing equipment between 1908 and 1959.

This particular scale is not a bankers scale, but what was known as a 'special', and made to enable a customer to speed up the tedious job of counting vast quantities of milk checks. i.e. 100 or more of the small aluminium milk checks would be carefully counted out into the weight end pan, - then the goods end pan loaded with similar denomination checks until equilibrium was achieved. (much quicker than counting!) Sometimes identical linen bags would be used - the counted ones being bagged and put on the weight end, and the others filled into a like bag on the goods end. A similar operation to a bank scale, but no weights used. The weight shown on the illustration is just an odd weight, not a 'bankers weight', and nothing to do with that scale.



The C.W.S. - or Co-operative Wholesale Society is the manufacturer and supplier of a vast range of food and dry goods to the Retail Co-operative movement and also supplies services such as Engineering, Shop fitting etc. etc. - including the manufacture and servicing of its own weighing equipment to the numerous different retail Societies. The manufacture of scales and weights was from 1908 to 1959 when the decision was made to supply factored scales from Avery, Berkel, Herberts, Salters etc. (Our production of scales started in Garden Street Manchester c1908 and later in Birmingham - 1920 when we bought out Hall & Son in Farm Street, Hockley.)

The scale was in my possession and was shown at one time in our collection at Leeds, (the collection was presented to the Museum of Science and Industry in Manchester in 1988). The date attributed to this particular item is not c.1900 (We hadn't started then !) - but more likely to be the early- to mid-1930s as the ivorine indicator is one used on our early stainless steel dispensing balances, and the spirit level is the type used on our early AS198 semi-automatic scales, both being made at that period.

The Editor thanks John Lound for his interesting correction. We strive to publish correct facts always.

Samuel Turner Senior Parcel Scale

BY PETER LAYCOCK

The best thing about collecting scales is that you never know when you are going to find a treasure. The thrill of the hunt keeps you coming back. I found such a treasure one rainy Saturday afternoon at Lakewood Fair grounds in Atlanta. Many of the dealers there set up their wares on blankets on the grass. On my way back to the car in an attempt to escape the rain, I spotted, as one does, out of the corner of my eye a large pear-shaped brass weight attached to an iron arm. All of a sudden the rain didn't matter but rather a sense of anticipation swarmed over me as I privately practiced my cool and nonchalant demeanor as I approached the dealer. There on the ground were several parts of a Victorian British parcel scale that included the brass weight, the iron bar, a hardwood base and a brass post from which the arm and weight were to be suspended. Fortunately for me the dealer hadn't forgotten about the rain and was anxious to make one final deal before he packed up to head for home. We quickly concluded a deal and I was again heading to my car with a treasure that I purchased for the princely sum of twenty dollars.

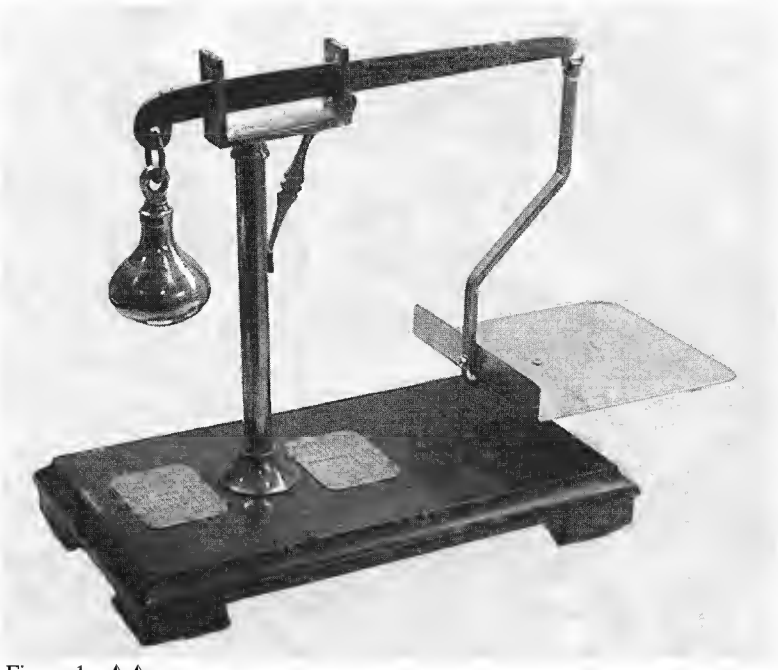
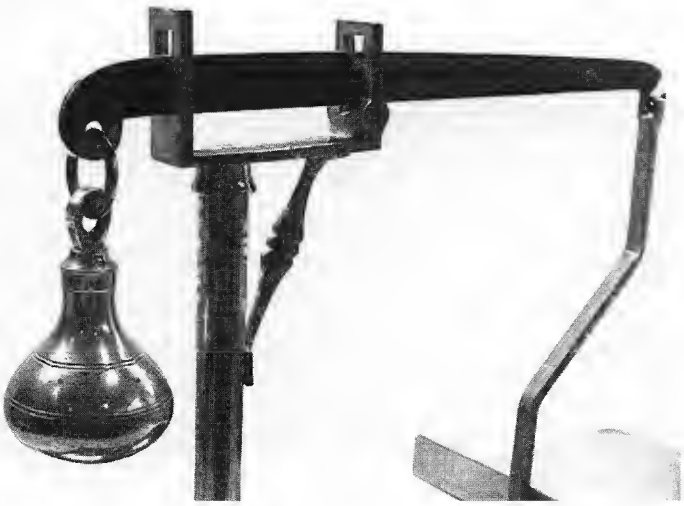


Figure 1. ⮝⮝

Figure 2. ⮟⮟

Figure 3. ⮟⮟



On further examination I realized that it was missing the device upon which one would put parcels and mail for weighing. A search of my copies on *Equilibrium* helped me identify my scale as a bismar manufactured by Samuel Turner Senior a scale maker from Birmingham. From a description of the patent and a picture of a similar but much smaller scale I was able to determine what the letter tray should look like (EQM 568 and Fig. 12).

Figure 4. ⋎⋎

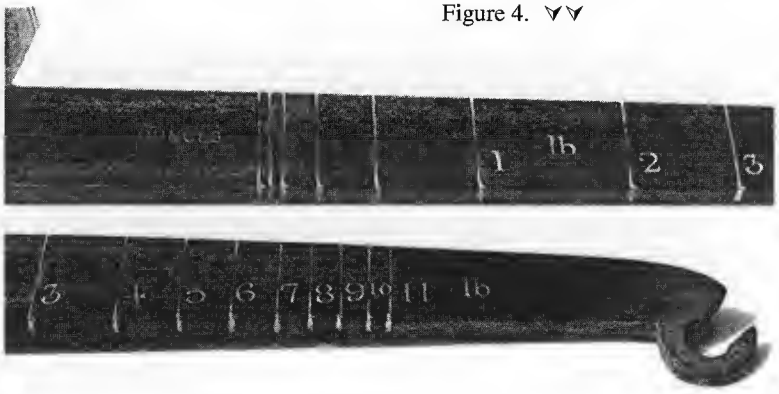


Figure 5. ⋏⋏

My dilemmas now were how do I go about creating a replacement hanging letter tray? How much should it weigh and how large should it be? I weighed the brass weight and found it to be twenty ounces. I then placed the arm at position one and hung a number of weights on the hook until it came into balance. One might expect the sum of the weights would be exactly twenty ounces but to my surprise it actually required twenty and one half ounces to come into balance. After giving this dilemma some thought I concluded that this scale, as is the case with several other postal scales, was probably preloaded to accept mail up to one half ounce. That being the case I determined that the letter tray should be twenty ounces. The first issue was resolved. However I must admit that I took a little license on the size and look of the letter tray. So with my rough sketch and my scale I went off to a local metal fabricator and together we agreed on a hanging letter tray consisting of an iron hanging arm and a brass plate both together weighing exactly twenty ounces. With the addition of the new tray my scale was now complete, although not entirely genuine it was once again equipped to do its work (figure 1).

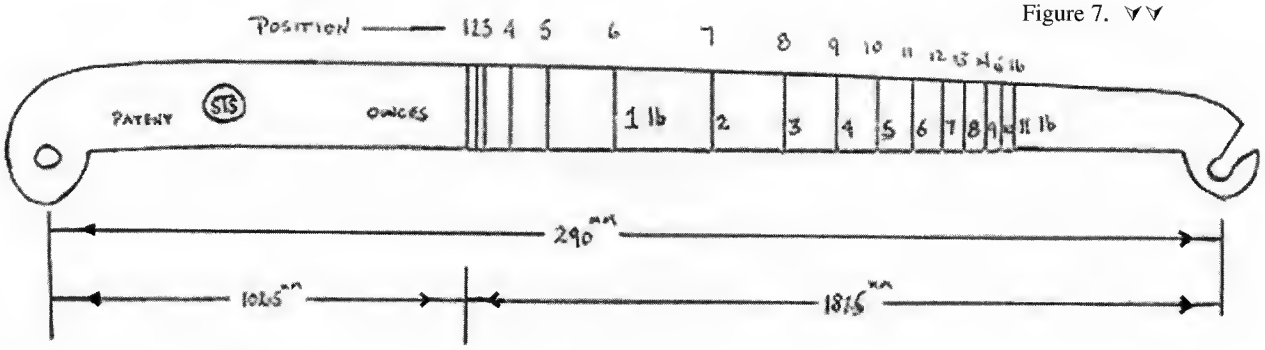
The British patent for this scale No. 11255 was issued to a S. W. Suffield on July 13th, 1889. The following description is recorded in EQM on page 568. *A bismar letter scale has a beam which can slide through slots at the top of a pillar. The outer slot has a knife-edge pivot; the other slot is a guard to prevent excessive movement of the beam. A weight is suspended from one end of the beam and a letter plate from the other end. The beam is graduated in ounces.*

Figure 6. ⋎⋎

Weight and Length Differential by Position

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Length from First Position (mm)	0.00	1.50	4.00	9.75	19.00	35.50	60.50	78.00	91.50	101.50	110.00	117.25	122.50	127.50	132.00	135.50
Weights in Ounces (a)	0.5	1	2	4	8	16	32	48	64	80	96	112	128	144	160	176
Weights in Ounces plus Poise (b)	20.5	21	22	24	28	36	52	68	84	100	116	132	148	164	180	196
Millimeters/Ounce (a)	0.00	1.50	2.00	2.44	2.38	2.22	1.89	1.63	1.43	1.27	1.15	1.05	0.96	0.89	0.83	0.77
Differential by Increment (a)	0.00	-1.50	-0.50	-0.44	0.06	0.16	0.33	0.27	0.20	0.16	0.12	0.10	0.09	0.07	0.06	0.06
Millimeters/Ounce (b)	0.00	0.07	0.18	0.41	0.68	0.99	1.16	1.15	1.09	1.02	0.95	0.89	0.83	0.78	0.73	0.69
Differential by Increment (b)	0.00	-0.07	-0.11	-0.22	-0.27	-0.31	-0.18	0.02	0.06	0.07	0.07	0.06	0.06	0.05	0.04	0.04
Weights/Poise plus Weight (c)	41.00	21.00	11.00	6.00	3.50	2.25	1.63	1.42	1.31	1.25	1.21	1.18	1.16	1.14	1.13	1.11
Differential by Increment (c)	0.00	20.00	10.00	5.00	2.50	1.25	0.63	0.21	0.10	0.06	0.04	0.03	0.02	0.02	0.01	0.01

Figure 7. ⩛⩛



This is a relatively large scale. It stands 35 centimeters high and the base is 20 by 35 centimeters in area. Attached to the top of the brass pillar is the cradle that holds the graduated iron arm. At the forward position there is a knife-edge upon which the load balances (figures 2 & 3).

The iron beam has been graduated with sixteen positions for placing the load on the knife-edge. A line on the side and a small v shaped groove on the bottom identify each position. At position one the scale is balanced by adding one half ounce. As it does not balance at position one with zero weight, as stated, it is my assumption that the scale has been preloaded by one half ounce to facilitate the weighing of small letters for the user. The subsequent six increments double the previous weight from one ounce up to two pounds. Positions eight through sixteen are all in increments of one pound up to eleven pounds (figures 4 & 5). On this particular scale there was no need to further calibrate between each pound as the postal rates of the time established one fee for all mail within the range of each pound. The table (figure 6) records the distance between each position in millimeters and the weight for each position at which the scale is balanced. The numbers one through eleven have been stamped into the metal identifying lines for each corresponding pound. The lines for the ounces ½, 1, 2, 4, 8, are not identified except for the notation 'ounces' stamped on the bar before the first position (figure 7). I suppose that the user would quickly learn and memorize the weight for these positions.

Figures 8 & 9 ⩛⩛

A notation of 'PATENT' and the maker's mark are also stamped on the iron beam. The maker's mark is almost indistinguishable but it is the unmistakable stylized mark of Samuel Turner Senior with a 'STS' inside a circle (figures 8 & 9).

The twenty-ounce pear-shaped counter weight is attached to the beam by a rugged copper ring. The weight itself is a handsomely machined two-piece brass poise. The top is held in place by a brass pin, which has been assembled after small lead shot have been inserted into the cavity to bring it to the proper weight (figure 10).

Figure 10. ⅄⅄

The scale is mounted on a nicely finished, four-footed hard wood base. Attached to the base are two 7.5 by 5.5 centimeter brass postal rate plaques. The rates are for the period 1886 to 1897 (figure11).

A smaller solid brass postal scale of the same design and patent is in the Diana Crawforth-Hitchins collection. You will notice the striking similarity of these two scales. This smaller one weighs mail up to eight ounces and has postal rates for the same period. It also has the patent designation and the STS trademark stamped into the brass beam. It sits on an attractive stylized round brass base (figure 12).

As stated earlier the patentee was Samuel Wilson Suffield of Sutton Coldfield (near Birmingham), patent #11255 was granted to him on July 13, 1889, (EQM 566-568) thus helping to more closely identifying the date of these scales.

The maker, Samuel Turner Senior and latterally Samuel Turner Ltd (using the same trade mark) was manufacturing scales and other items in Birmingham from 1858 to 1940. In 1886 they advertised as follows: *Letter scales, postal & parcel balances with weights for all countries. Makers for the GPO.*

Mr. John Turner, son of S. Turner, was listed in various trade directories. He operated from several different locations from 1881 until 1932. From 1881 to at least 1889 he operated at 15a Vittoria Street, Graham Street Birmingham, during which time the directories proclaimed that he was the *sole inventor of the Skeleton letter balance, letter clips, inks, fancy call bells, and the Parcel post machines to meet the present regulations*. From 1894 until at least 1905 he operated from 41 Vittoria and finally at 56 Frederick Street from 1913 until 1932.

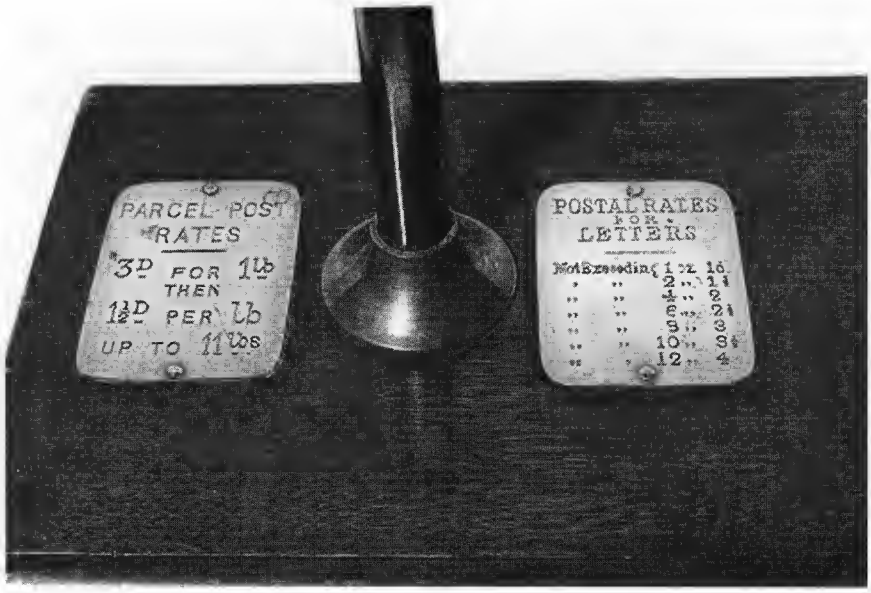


Figure 11. ⅄⅄

Samuel Turner Senior was known to manufacture items for a number of retailers, some rather well-known retailers that

Fig. 12. ⅄⅄ The smaller version derived from the same patent. Photo compliments of Diana Crawforth-Hitchins.

offered for sale a selection of products manufactured by Samuel Turner Senior include; Benetfinck & Co., Geo. Wright & Co., Day & Millward, Pooley & Son, Perry & Co., John Heath, B.W.W.B., Reynolds & Chilton, C. Wilcock & Son, Houghton & Gunn, Houlston, and W & T Avery. However, there is no evidence that any of these retailers offered the 'STS Postal Bismar' for sale.

It is not anticipated that this type of postal scale was widely used given that there were several alternative types of postal scales that were far easier to use. Finding the right position for any given load by moving the arm back and forth through the cradle is far more tedious than simply adding weights, as one would do with a roberval.

So there you have it. Saved from the junk heap this scale has endured a mysterious journey from Birmingham to Atlanta and finally to Toronto with probably several other ports of call along the way. Today it sits in a prominent place among a selection of my favorite scales.

Acknowledgements

I would like to thank Diana Crawforth-Hitchins for providing valuable assistance in attempting to trace the history of the manufacturer.

Bartlett Pairs Postscript

BY ALBERT RANGELEY

Editor's note: *The following are postscripts as a follow up to the article "Bartlett Pairs" in EQM Pages 2919-2922.*

In my collection I have a catalogue of Bartlett & Son Ltd dated July 1913.

There are 27 pages on scales and weights but the model indicated is not included as it is obviously of earlier manufacture. The remaining pages are devoted to shop requisites of Bartletts.

It seems that on the acquisition by Pooley, the Head Office of Bartlett was moved from Bristol to 72, John Bright St., Birmingham.

On the acquisition of Pooley by Avery in 1914, Avery also took over the Pooley subsidiaries of Hodgson & Stead of Salford, W. Bayliss & Co. of Birmingham, besides Bartlett.

It seems logical that the Newcastle address is the same premise occupied in the 19th century and was merely another branch of the Bristol Head Office.

Head Office:—

72, John Bright Street, BIRMINGHAM.

TELEPHONE: Midland 1738. TELEGRAMS: "Bartlett, John Bright Street, Birmingham."

BRANCHES:

LONDON: 89, Fleet Street, E.C.
Telegrams—"Measuredly, London."
Telephone—6126 Holborn.

SHEFFIELD: 4, Savile Street & 82, Snig Hill.
Telegrams—"Pooley, Sheffield."
Telephone—1744.

GLASGOW: 69, McAlpine Street.
Telegrams—"Pooley, Glasgow."
Telephone—427 Corporation.

MANCHESTER: Cathedral Street.
Telegrams—"Pooley Son, Manchester."
Telephone—3106 City.

NEWCASTLE-ON-TYNE: City Road.
Telegrams—Pooley, Newcastle."
Telephone—1105 Central.

BRISTOL: 76, Victoria Street.
Telegrams—"Bartlett, Bristol."
Telephone—4203.

PORTSMOUTH: 298a, Commercial Road.
Telegrams—"Bartlett, Commercial Rd. Portsmouth."
Telephone—422 Corporation.

GATESHEAD: 20, West Street.
Telegrams—"Pooley, Gateshead."
Telephone—246 National.

NOTTINGHAM: Lister Gate
Telegrams—"Pooley, Nottingham."
Telephone—892.

BELFAST: 43, Chichester Street.
Telegrams—"Pooley, Belfast."
Telephone—1271.

CARDIFF: 37, Mill Lane.
Telegrams—"Bartlett, Mill Lane, Cardiff."
Telephone—1690.

LIVERPOOL: 9, Manchester Street.
Telegrams—"Pooley, Liverpool."
Telephone—1353.

DUBLIN: 24, Lower Abbey Street.
Telegrams—"Pooley, Dublin."
Telephone—2755 National.

MIDDLESBRO': 8, Boundary Road
Telegrams—"Pooley, Middlesbro."
Telephone—593

SUNDERLAND: 138, High Street West.
Telegrams—"Pooley, Sunderland.

BRANCHES IN ALL LARGE TOWNS.

Telegraph addresses: Note the telegraphic addresses shown in the section on Branches. They vary from 'Measuredly' to 'Pooley' to 'Bartlett'.

Since writing my comments I came across another Bartlett beam scale as type B and bought it. This scale is signed on the beam 'Bartlett Bristol' and it was accompanied by a contemporary set of weights from 4lb to 1oz in brass.

The latter bear verification marks of Bristol, these being the two types in use when Bristol decided not to use the uniform design of stamp in 1878 until they were compelled to use auniform design in 1890. The stamps are City of Bristol in circular form around G and crowned CB over G. The weights also bear the mark of Monmouth which until 1888 was part of England and not Wales. Monmouth also opted out of using the uniform design of stamp until 1890. The mark is C over M with OF in between.

The purpose of mentioning the weights is that the scale also bears the above marks of Monmouth, one in the centre of the goods pan and one in the centre of the weight end. The marks are from the same die and I assume that the scale and weights have been together since new.

The scale does not bear the Bristol marks because stamping did not apply to scales until the 1890 Model Regulations. This says that existing scales that are correct and do not facilitate the commission of fraud need not conform in all other ways. New scales had to comply fully.

My scale also bears the subsequent uniform mark of Warwickshire as indeed do the weights. Geo V has been applied to the beam into the brass area of the fulcrum and Geo V into the undercut lead filled hole in the weights with a date stamp of 1918.

The good condition of the scale indicates to me that it had not seen much use since 1918 and since it did not bear the Class marking of B or C nor the capacity, which from the length of the beam being 14 inches, would be 4lb, it would not be in compliance with the current Act. The owner probably had consigned the scale to the attic and bought one of the new self indicating scales which came into vogue in the early 1920s.

Herbert Griesshaber's 1648 Cologne Langenbergh Scale and Box

BY GARY BATZ

Editors note: *Due to errors and inaccuracies in the article entitled Johann Langenberg Coin Scale in EQM pages 2866 - 2867, member Gary Batz agreed to send these corrections.*

On Sunday, June 6, 2004, I spoke to our member for about an hour to inquire whether he still had the coin scale and box pictured on EQM 2866. Yes, he replied, and nothing has been changed or added in the years since 1987 when Carl Moennig died, shortly after I tried to visit with him in Cologne. Herr Griesshaber was of course surprised that this historic artifact was still under active consideration, but I explained that I had found some of the information in the article somewhat curious. We discussed each recess, the inscription above it and the weights in each specific cavity. Based on our conversation he moved a few weights around and sent me newly-made pictures, especially of those weights that could not be seen in the EQM photo as they were under the inside sliding lid. He also sent me Carl's original German text which was used in partial translation on EQM 2866. It is the original findings and the translation which my essay is aiming to deal with.

The inscription on the inside lid translates as ***Scale and weights made by Master Johan Langenbergh on Broadway in the Golden Scale in Cologne 1648.***

Fig. 1. ⩓⩓ Langenbergh's 1648 scale inside box. This view shows the weights that are covered in Fig. 2.

Following the new picture from top left to bottom right, these are the inscriptions and the weights present. Some inscriptions call for weights that are no longer in the box, but that may be because the originals were not suitable for the particular owner at the time and he got himself different ones. This fact will be gone into as it arises. The inscriptions are given in ***German*** as they appear; and their **English name** is used in the explanation. The mass was newly determined by Herr Griesshaber, (owner of a scale and weights concern). All weights are for gold coins.

1. ***Halb Rosenobel*** 3.76 g: The **half rose noble** dates from the years 1464-1470; it succeeded the Henricus noble of the three Henrys III, IV and V. The fact that this coin was still around in 1648 is explained by the many official imitations in Flanders, the Northern Netherlands and even Germany. The Danes collected as toll one rose noble for every ship passing the Sound.

2. ***Cron*** 3.02g: The Statenkron or **Crown of the States** was minted in small quantities in 1577 by the Northern Netherlands states that had separated from the Southern Netherlands under the Spanish King Philip II who ruled with an iron hand. It shows a floriated cross with the initials S-K. The dark coloration of the weight (100% correct in mass) seems to indicate it was substituted later on for the somewhat heavier French crown or ecu d'or which was called a Cron by the weight makers in Cologne, Antwerp and Amsterdam.

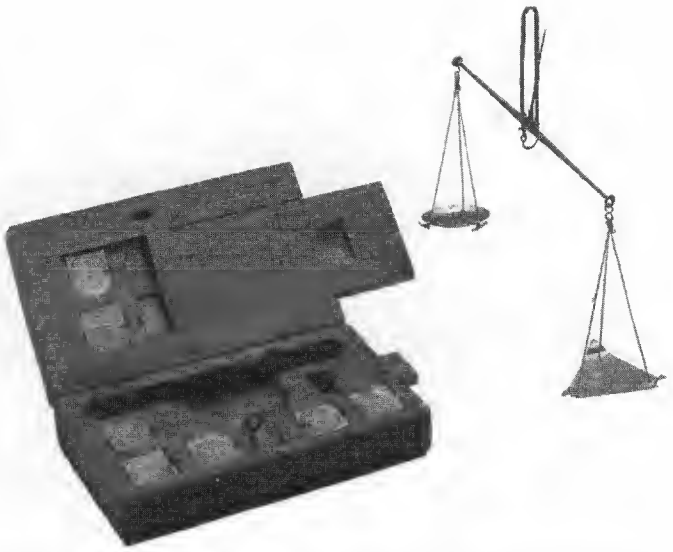


Fig. 2. ⅄⅄ Langenbergh's 1648 scale with box. This view shows the lid that covers eight of the weights.

3. ***Goldgulden*** 3.08g: The **goldgulden** of the Bishops of the Rhine had existed since 1340, but its mass fluctuated until the Imperial Coin Ordinance of 1559 set it at 3.24 g. Most of these coins showed the Imperial orb on one side; hence this symbol was adopted to indicate this particular coin. The weight is 5% underweight, not surprising with the lower right corner "adjusted" by someone. There existed a distinctly different coinweight for the gulden of Rudolf van Diepholt as postulate bishop of Utrecht.

4. ***Halb Schifnobel***: Instead of the half Henricus noble we find a whole **angel** weighing 5.03g. The angel in this form (80 grains) existed from 1464-1602, but was continued with a lesser mass by James I and Charles I. No continental weights exist for these later ones. Their missing mass was discounted by the transacting parties. The weight shows the image of the Archangel Michael spearing the dragon, proclaiming the perpetual fight of Good versus Evil.

5. ***Halb Pistolet*** 3.32g: This **half pistol of Spain** dates from 1537 and had the same mass as the French Louis d'or which was introduced by King Louis XIII in 1640. It shows the cross of Jerusalem. Because the cross looks like two crossed crutches, the Germans called it a Krueckenkreuz. It could be used to weigh the French pistols minted 1640-1709.

6. ***Langcruzade*** 3.454g: This **Portuguese cruzado** shows the long cross of Calvary and the letters K-D. They stand for Kalvarie Dukat or Kreuz Dukat, the latter meaning cross ducat. Not fully a ducat of the Hungarian or Spanish type, see below, a suitable nickname helps as the Portuguese called all their gold coins cruzados. K-D is unlikely shorthand for Cross Daalder, the Burgundian silver coin weighing 29.4g.

7. ***Halb Albertus***: Instead of the half Albertus, a coin issued 1600-1605 by the Archdukes Albert and Isabella administering the Netherlands for Philip III and showing the couple prominently on all their coins and coinweights, we have a half **Unite** of James I of England 4.478g. It was customary not to cut several dies, therefore the half and the quarter unite had the same XX behind the king's head for the 20 shilling value of the full Unite. The money changers knew how to deal with that.

8. ***Halb Engelot*** 2.482g: This is the **half of the angel** coin described in 4 above. It was made in all the same years as the full angel, from Edward IV to Elizabeth I.

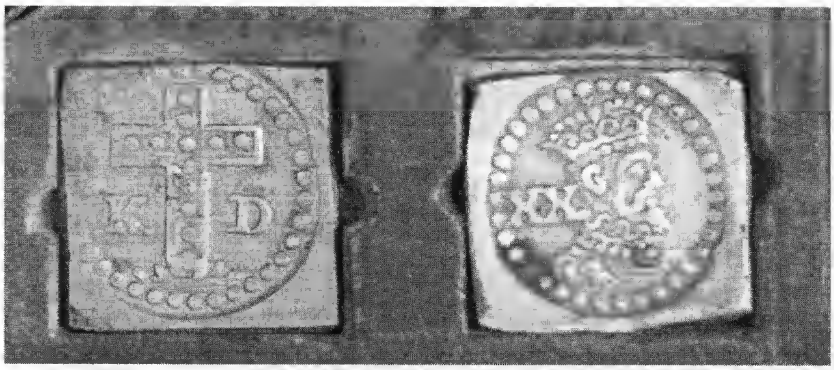


Fig. 3. ⩓⩓ Calvery Cruzado and Unite. (see numbers 6 & 7)

Fig. 4 ⩓⩓ Statencron. See number 2.

9. ***Rosenobel*** 7.583g: This full **rose noble** or ryal is but 2.5% short of the legal mass. The king gave the minter a certain allowance on mass and fineness, called the tolerance. As well, another lower tolerance weight was established by periodic official ordinances after the coins had lost mass through ordinary wear and fraudulent clipping. Unfortunately few of the German regulations have survived. The Dutch ordinance of 1606 called for 7.69g, thus this weight is only 1.4% light by that standard.

10. ***Pistol*** 6.747g: This is the **full pistol** that pairs with the half pistol above. It is 1.75% short of the legal mass, and probably close to the tolerance mass.

11. ***Dubbeldukat*** 6.97g: This **Spanish double ducat** shows the facing images of Ferdinand and Isabella, known as Their Catholic Majesties. This weight is 10 milligrams short of the required tolerance mass. The inscription is hard to read as the word ducat was often abbreviated dl, similarly to the gulden being gl. The l looks somewhat like a curve.

12. ***Albertus***: Instead of the full Albertus (1600-1610), see above, there is a James I **quarter Unite** 2.20g. Usually, the lighter coinweights were on the "upper deck" and the heavy ones on the "main deck". However, the dust accumulated over the last 450 years indicates that this has been its location for a long time. The sliding lid closes tighter than the box lid, allowing dust to get to the weights on the main deck. Often the upper deck weights look uncirculated which is true here with the exception of the Statencron and the K-D ducat.

13. ***H Duc***: This inscription was not written contemporaneously and seems to refer to a **Hungarian ducat**. Here is a full ducat, 3.462g, showing the saint and King Ladislas of Hungary with cross staff and orb. H-D flanking him indicates that this is a *Hungariae Ducatus* or Hungarian ducat, the coin which was so well and truly made over the years in Hungary that in 1559 the German Empire adopted it as its standard; it was followed by the Dutch from 1585 on with their Hollands Dukaat, by the Spanish with their ducat or excelente, and by everyone else where ducats were minted.

Finally one more curiosity should be mentioned, namely the mark of the lily in the triangular pan. It is strange to find one with this rare mark since there were four generations of Langenbergs who used the mark "IL with the pierced heart" in all their scale pans, something our member G.M.M. Houben discovered when he became intrigued by the same scale mark spanning a century.

Langley De-Liar

BY HOWARD MURRILL

Not all fishermen are liars, but for the ones who are, there's the Langley De-Liar. The De-Liar is a little combination tape measure and scale that a fisherman can use to determine the true size of his catch.

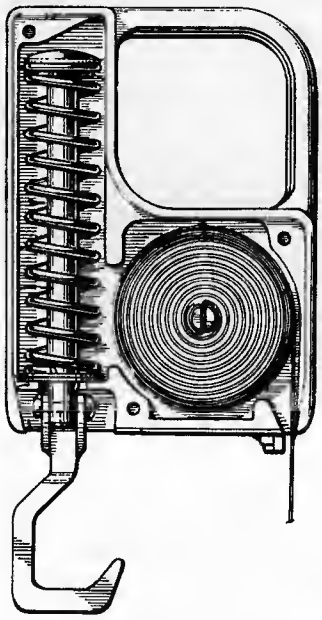


Fig. 1. ⮝⮟ H. I. Mandolf & J.R. Morrow applied for 2 patents for a weighing & measuring device on Aug. 19, 1946. Design Patent no. 150,146 was granted on July 6, 1948 and patent no. 2,603,474 was granted on July 15, 1952.

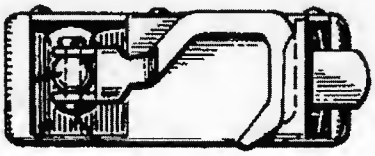


Fig. 2. ➢➢ These are believed to be the earliest De-Liars. They have aluminium face plates with black lettering. The earlier of the two is believed to be on the left . The scale on the right added LBS above the scale. Both are marked Pat. Pend.

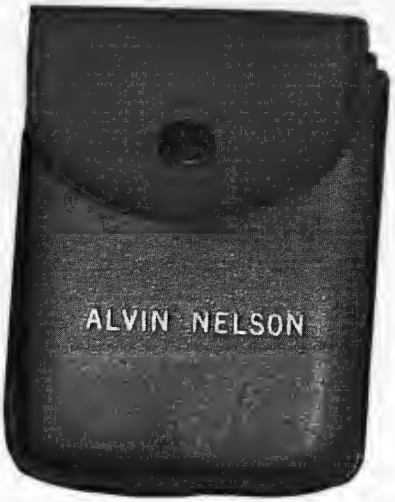


Fig. 3 ⮝⮝ This rare De-Liar is marked "The 1,000,000th Langeley Fisherman's De-Liar" and is made of sterling silver. It has a black face with silver lettering and is marked Pat. Pend. Its tan leather case is inscribed Alvin Nelson.

Fig. 4 ⮜⮜ The second De-Liar believed to be produced had a black face with silver lettering. The left hand scale is identical to the latter silver faced version shown in fig. 2. The latter scale added Made in U.S.A. and model 208. These small scales measure 2¼" by 1⁹⁄₁₆". They have a capacity of 8 pounds and can measure a 24" fish. All of these scales are marked Pat. Pend. leading one to believe that they were produced before the design patent was issued in July of 1948 and after the patent applications were filed in August of 1946. The bodies of these scales were all painted black.

Fig. 5 ⮝⮝ Many De-Liars are found in the bottom of tackle boxes complete with the original box. The larger De-Liar, shown here, was produced as model 228. This example came in a red box with black & white lettering. It has a black face with silver lettering, a capacity of 28 pounds or 12 kilograms, and measures 42" fish.. Added to its face was "not legal for trade".

Fig. 6 ⮝⮝ This De-Liar was made to look like a chewing tobacco box as a promotional give-away. If you bought 2 cans of Skoal® chewing tobacco the tape measure and scale were free. Its case is green with white lettering and it measures 2⅝" in diameter. The scale pulls out from the bottom and the dial is on the back. The tape measure is on the lower left.

Originally design patented in 1948 (figure 1), the De-Liar was manufactured in San Diego, California by the Langley Corporation. In recent years, other companies such as Zebco, have sold De-Liars but most collectors are interested only in the Langley models. Zebco bought out Langley in 1962, but may have continued to use the Langley name until 1973.

De-Liars have been a favorite gag gift for lying fishermen for about 50 years and many of them, in their original boxes, have been forgotten in the bottom of tackle boxes for decades.

There are two models of the De-Liar. The model 208 weighs fish up to 8pounds and measures fish up to 24inches long. The model 228 is larger, weighs up to 28pounds and measures 44inch fish. Special promotional De-Liars were produced, including one with the appearance of a can of chewing tobacco (figure 6).

Fig. 7. ⮜⮜ These De-Liars are painted green and have green faces with silver lettering. Rather than Pat. Pend. they read Patented leading one to believe that they were produced after the patents were issued. In addition they measure in centimeters as well as inches. The model 228 also weighs up to 12kg.

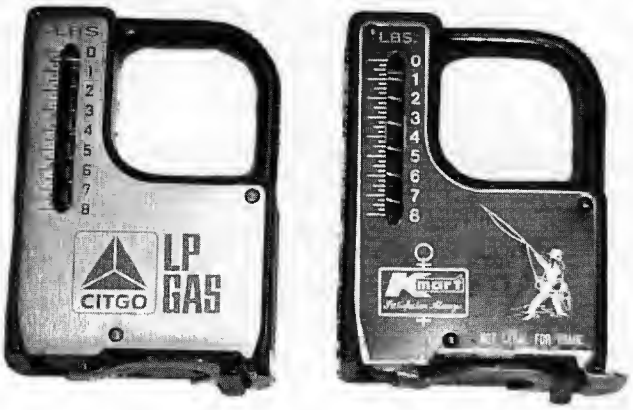


Fig. 8 ⮝⮝ De-Liars were also produced for advertising or with private labels such as these advertising Citgo Gas and Kmart stores. These are model 208 De-Liars and their bodies are made of plastic. The scale case of the Kmart De-Liar is stamped "Japan" on its lower back.

Fig. 9 ⮝⮝ The De-Liar shown here shows the measuring tape and hook for the scale. The hook folds up when not in use.

Dates of manufacture are difficult to determine, but there have been numerous variations. All Langley models that I have seen, have had a pot metal body with an aluminum front plate. (Zebco models are plastic.) One of the earliest is a model 208 with a silver-colored front plate and black lettering. It doesn't show a model number, but based on size, it is a model 208. After that, a series of minor changes were made. This may or may not be in correct order:

The front plate was changed from black letters on silver (figure 2) to silver letters on a black background (figure 4).

"LBS." was added to the top of the scale.

The model number was added.

"Pat. Pend." was added.

The model 228 was added to the line.

"Not legal for trade." was added.

"Pat. Pend" was changed to "Patented."

The color of the pot metal body, and the background on the front plate were changed from black to green.

A metric scale was added and centimeters were added to the tape.

Fig. 10 ⮜⮜ Several different versions of De-Liar faces can be found on the plastic bodied Zebco® produced models. The scale on the left and at center are model 228 while the newer scale on the right is a model 208. These are still in production today by Zebco®.

De-Liars are reasonably accurate. I can remember in the 1950s when my uncle, a gunsmith, used one to set the trigger-pull on deer rifles. Currently, De-Liars are available at low prices. They can be bought on the internet at less than $5 plus shipping for the most common models.

They make an interesting display. I have mine in a small glass cabinet on the wall of my shop. When I mention that I collect De-Liars, the usual reaction is, "What's a De-Liar?" To me, it's a unique collectable that appeals to collectors of vintage scales, fishing tackle, measuring instruments or perhaps to collectors of unusual gadgets.

Many questions remain unanswered:

When did production begin?

When did the lettering change from black to silver?

Were the 208 and the 228 the only models?

Were there other colors besides green and black?

Did the fabled left-handed De-Liar ever exist?

And most importantly, is your collection of scales complete without a De-Liar?

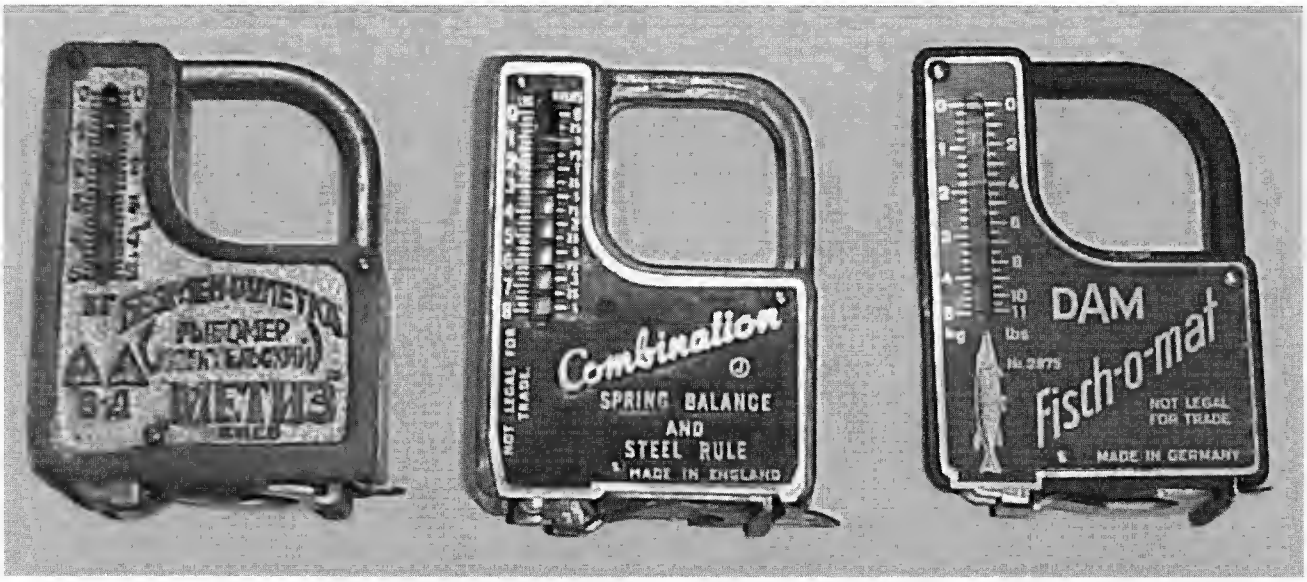


Fig. 11 ⩓⩓ The scales above are based on the same patent as the De-Liar. The first is from Russia and is believed to read, " Scales for the non-professional fisherman." It is gold with red lettering, is made of plastic, weighs in kg and measures in centimeters only. The center scale was made in England and is made of blue painted metal. It has a black face with silver lettering, weighs in kilos and pounds, and measures centimeters and inches. The scale on the right was made in Germany. It is made of metal painted red and has a red face with silver lettering. It weighs in kg and pounds and measures inches and centimeters. Each of these scales are the same size as the Langley model 208.

About the Author:

Howard Murrill is a retired middle-school science teacher who lives in Lenoir City, Tennessee. He collects coins, Cushman motor scooters and De-Liar fishing scales. He is a dealer in antiques and vintage fishing tackle. He and his wife, Willette have been married almost 49 years and enjoy traveling having visited all 50 states as well as several international venues. They have four children and five grandchildren.

Topweight, Face and Power

BY JOHN KNIGHTS

(Not a firm of provincial Solicitors, but some of the terms encountered when dealing with the Theory of the Beam)

It actually came as a bit of a shock to me, many years ago, to learn that the beam needed a theory. I was familiar with the concept of the lever and assumed that a beam was merely two equal levers, joined together with pans hanging on the ends. I had failed, of course, to realise that such a device would merely wallow about when equally loaded and actually give very little indication of a true weighing. I saw the beam, simply, as a two-dimensional device without noticing that it would only work if there was a tiny but vital third dimension lurking invisibly within.

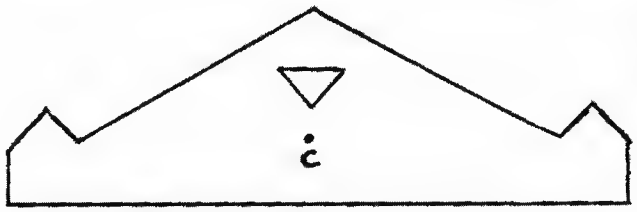


Fig. 1 ⩓⩓ Stable Equilibrium. The centre of gravity 'C' lies below the fulcrum.

This small, but vital, restorative force is provided by locating the centre of gravity of the beam at a point slightly below the centre fulcrum where it acts as a tiny pendulum when displaced, that draws the balanced beam back to the horizontal.

This 'stable' equilibrium is an essential state for a well-performing beam; given only, that too much stability militates against sensitivity, which is also a vital attribute. These two properties must coexist as a delicate compromise if the machine is to perform correctly.

Some beam scales and balances have 'gravity balls' which can be screwed up and down threaded rods to finely adjust the position of the centre of gravity.

Such an adjustment is referred to as putting on or taking off 'topweight' and is undertaken to position the centre of gravity at the ideal spot to give levels of stability and sensitivity appropriate to the efficient action of the beam.

A scale is more than its beam however.

Its purpose is to weigh, and therefore, the beam has load pans attached at the ends. When loads are placed in these pans a whole new set of forces are introduced into the system, which must be accommodated correctly for efficient operation.

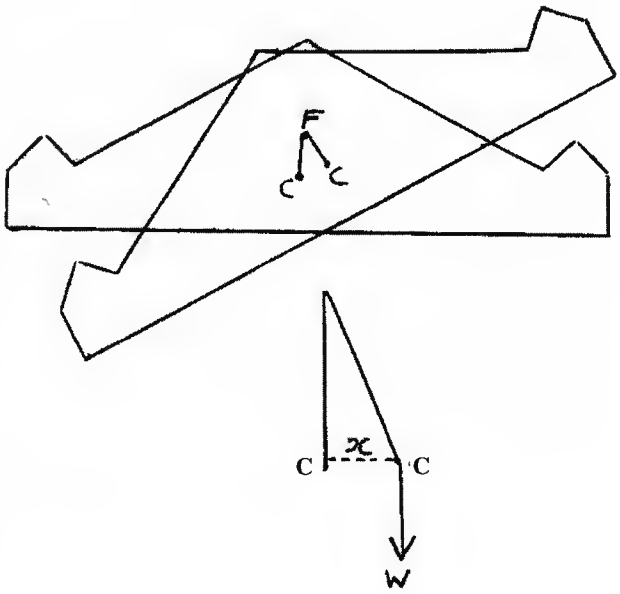


Fig. 2 ➢➢ When the beam is displaced from the horizontal, the weight acting through the centre of gravity 'C' tends to restore it to its original position. (Restoring moment = Wx)

This is where the concept of 'face' comes in, as the relative position of the terminal and centre knife edges has to be considered.

The 'theory' of the beam requires that all three pivots should be in the same vertical plane. In this way, the effective centre of gravity of the loaded beam retains a constant restorative force under all conditions, which is what is ideally required.

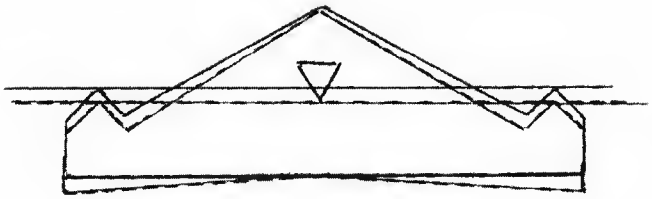


Fig. 3 ⩓ This beam has a positive face line. (End knife edges are higher than the centre.) When loaded the beam flexes and the three knife edges are in line. (Neutral face line.)

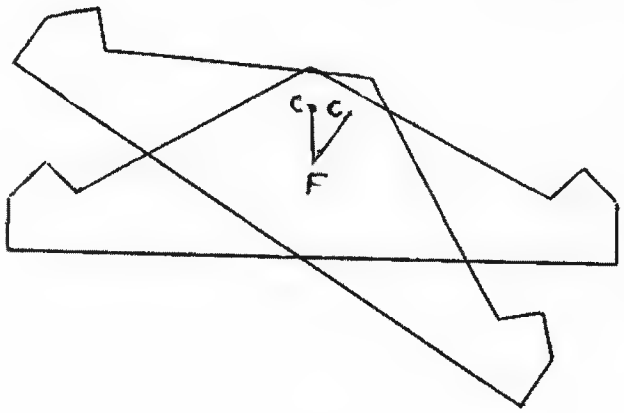
In practice however, allowance has to be made for beams flexing under load and some degree of compromise is again needed.

Placing the end knife-edges slightly higher than the centre is designated as 'positive face' and results in an initial increase in sensitivity (and loss of stability) as the scale is loaded. As the beam flexes under load however the alignment changes and the initial condition is restored.

Some types of scales have mechanisms to adjust the face line, by which knives can be raised or lowered as required. Solid brass beams, alternatively, usually had the requisite degree of face induced by means of a judicial tap on the bench.

The foregoing assumes that a stable beam is desired; which is usually the case.

In the UK, however, there was also the tradition of the so-called accelerating scale, with a beam deliberately constructed to be in unstable equilibrium.



This principle was employed in a number of applications, in the nineteenth century, including counter machines, steelyards, platform machines, weighbridges and deadweight machines.

The beam of an accelerating machine has the centre of gravity located above the central fulcrum and is therefore unstable. When the beam is displaced from the horizontal, instead of being restored; it continues to fall away at an increasing, or accelerating rate. The motion has to be finally curtailed by a stop, to prevent an excessive amount of displacement.

Fig. 4 ⩔ The beam is in unstable equilibrium as the centre of gravity 'C' is above the fulcrum F. When displaced from the horizontal, the beam continues to accelerate in the same direction. (Accelerating moment = Wx)

This principle (is it peculiarly British?) was clearly seen as a practical approach to weighing where extreme accuracy was not vital. Correct weight was judged by the speed of the fall (or rise) of the beam or steelyard; this being quicker and more convenient, than looking for the perfect balance of a stable or 'vibrating' system.

Fig. 5 ⅄⅄ Deadweight scales like the one shown here are still in use in British coal yards. They are used to weigh 50kilogram sacks of coal because modern scales could not withstand this heavy duty use. These scales retain their accuracy despite appearances to the contrary.

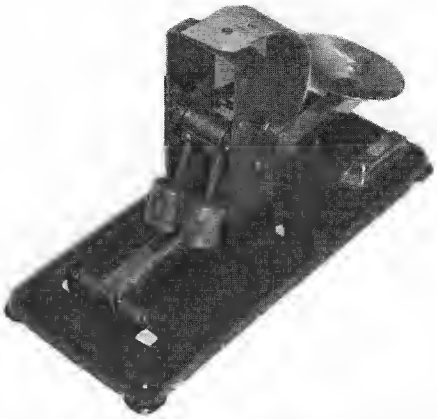
The accelerating principle disappeared from most types of equipment at the beginning of the 20th century although old accelerating weighbridges and platforms continued in use up until the 1970s

We do still see it, in fact, in the deadweight scale, which is in use, to this day by British coalmen, who still weigh up their 50kg sacks of coal on these scales. Modern types of machine can rarely survive the battering that such use entails.

The degree of instability of an accelerating machine is controlled by legislation and is measured by the amount of weight required to return a displaced beam to the horizontal. It was however a tradition for inspectors to allow more of this 'power', as it was known, than the regulations decreed in deadweight machines. It was readily understood that wear and tear was considerable in such equipment and a crisp accelerator, at verification, was soon transformed into an indecisive 'wallower' upon subsequent inspection, unless appropriate allowance was given.

I think this is where we came in.

Showcase



⅄⅄ This Eclipse Egg Grader is a very rare adjustable pendulum egg scale. It is made of green painted sheet metal and brass. The paper dial is calibrated from 16 to 30 ounces per dozen and reads "Patent applied for" and "Made in USA". John Lindsay collection.

Hanson Scale Company, Part 1 BY STAN HANSSEN

A history of the scale industry would not be complete without telling about some of the people and families that started some of the scale companies. In Europe we had Salter, Krups, Terraillon and Westa, to mention a few. In the US it was the Jacob family of Detecto, the Brierley family of Counselor, the Eriksons of Borg, the Hansons, the Hutchinsons of Continental Scale, and of course the Fairbanks brothers.

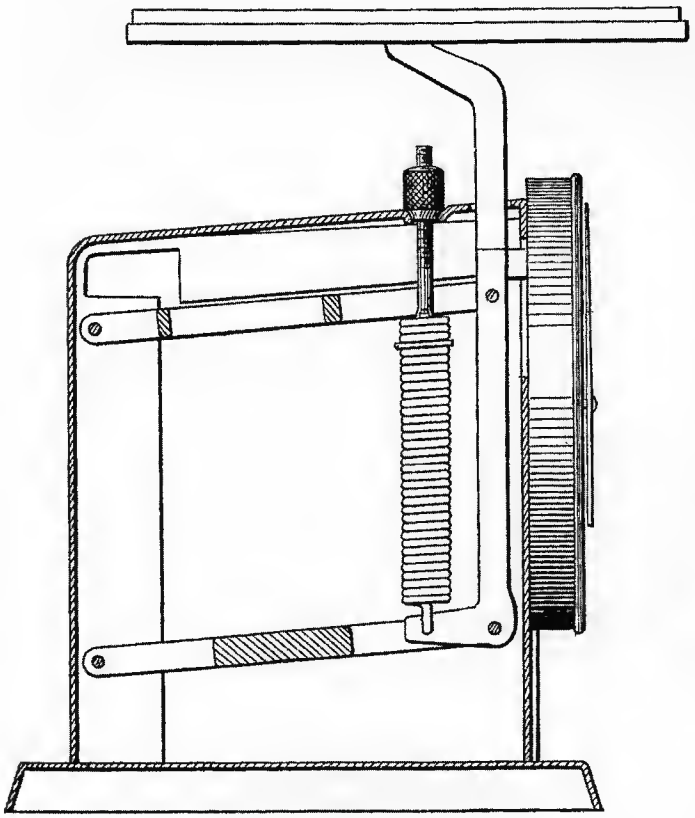


Figure 1 ⅄⅄ Patent number 612,968 was issued to Marius H. Hansen on October 25, 1898.

One of the scale companies was Hanson Brothers started by Marius Hansen. Marius Hansen was a Dane who was born in Svendborg, on the island of Fyn, in August of 1865. He was the second son and his father had a wood-turning business. He was apprenticed as a marine engineer at the Danish shipbuilding firm of Bormeister. There was a strike and Marius didn't approve so he left and went to St. Petersburg, Russia, where he worked as a machinist in a munitions factory that made torpedoes and other military equipment. Seeing no future there he left after two years with copies of Russian torpedo designs. He tried to sell them in Europe and was told they were obsolete. He then immigrated to the US and ended up in Chicago.

In 1888, shortly after arriving in Chicago, he started a small machine shop in a loft building on Randolph Street. There he started to repair Otto four cycle gas engines which had become quite popular as a motive power, the only alternative to a steam engine at that time. He was successful and soon brought a younger brother from Denmark to join him in the business. Soon another brother came as well as a younger sister. The business grew and he started experimenting with a design of an automobile among other things.

Shortly after his sister arrived he took her over to a dress shop to work as a seamstress. The shop was run by a Danish woman by the name of Jenny Jorgensen. She was a dress designer who had gone to Paris to look at Parisian dress designs with the intent of coming to Chicago for the 1893 Worlds Fair to sell these designs to the wealthy women of Chicago. Marius met Jenny and it wasn't long before they were married. With money she had earned, she helped her husband expand his business with new machinery.

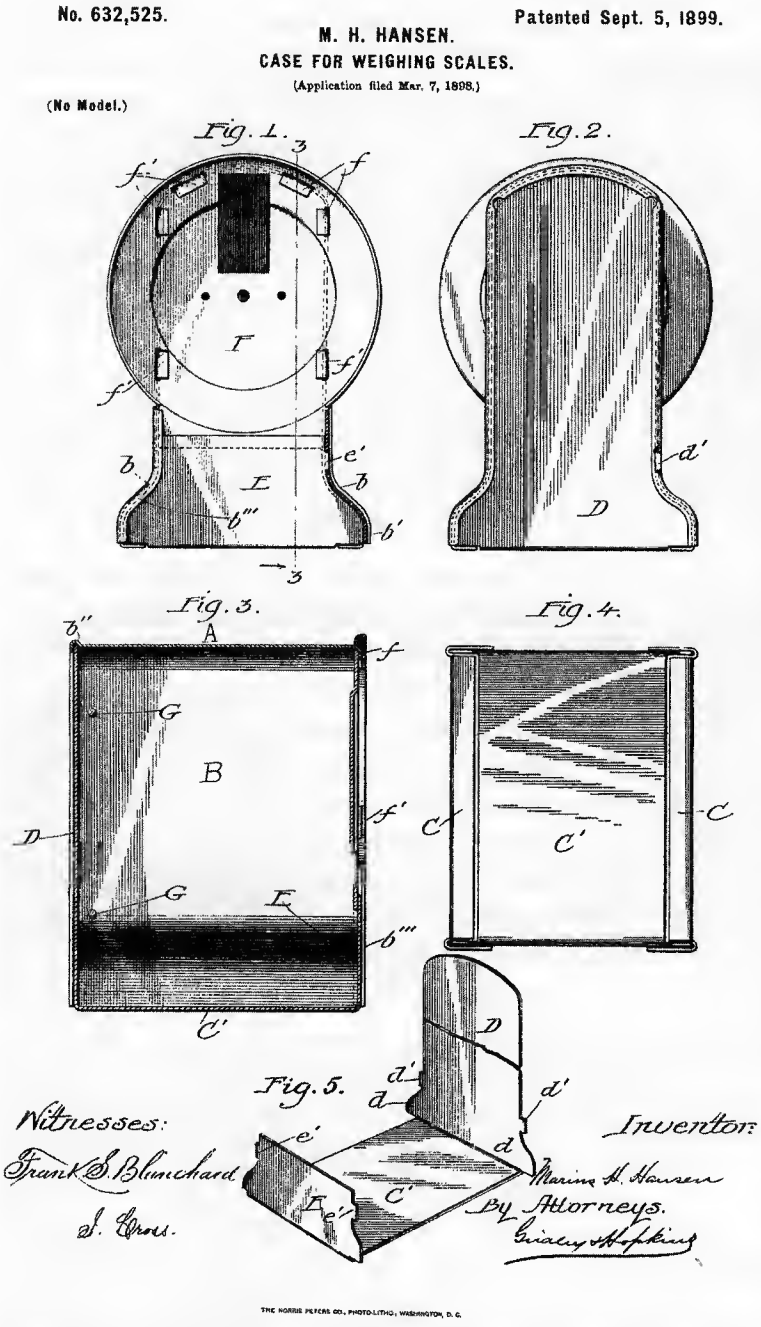


Figure 2 ⮝⮝ Patent number 632,525 was issued to Marius Hansen on September 5, 1899, for a sheet metal case for spring scales. Most family or kitchen scales manufactured prior to this date were made of heavy cast iron.

It was during this period of the 1890s, that Marius got an idea for a kitchen scale to be made out of sheet-metal instead of cast-iron. At that time strip steel 4" wide was available. He received US patent no. 612,968 (Fig. 1) in 1898 and no. 632,525 (Fig. 2) in 1899 for these sheet-metal cases. The firm built 300 scales but didn't know what to do with them. A visiting salesman told Marius that he ought to go see Mr. Wrigley the chewing gum man who bought items as give away premiums (Figure 3) to promote the sale of his chewing gum. Marius saw Mr. Wrigley who bought the 300 scales, and who asked "When can I get 300 more?" With this order Marius Hansen was in the scale business.

The auto was forgotten and then he devoted the rest of his business career to making scales. With his younger brother they organized Hanson Brothers Scale Company. You will notice the change in spelling. One day the local postman told Marius that in the US he should spell the company name with an 'O' in Hanson instead of an 'E' which he did.

William Hansen, his brother, became his partner. There were no written agreements between them. John Hansen worked for his two brothers but was not a partner. Marius was the inventor and he worked on various designs of kitchen or utility scales and received more patents. One patent received in 1904 was on a stamped washer that was wound into a spring so you could calibrate the spring and set an exact spring rate. Considering spring scales had been around for a number of years this was quite a step forward.

Figure 3 ⩓⩓ Hanson scales were offered by the William Wrigley Jr. Company in Chicago as premiums for several years. Image copyright of the Wm. Wrigley Jr. Company. Used by permission.

The business of the two hard-working brothers was successful. Marius, at his wife Jenny's insistence, moved to Rogers Park, a Northern suburb of Chicago at the time and built a home at 6969 N. Ashland Avenue. They had two children Stanley and Lucile. Jenny wanted to move out of the Scandinavian neighborhood in Chicago to raise children in a place where only English was spoken. She said "We are Americans and no longer Danish." It was a difficult move and it took them a while to be accepted by the old pioneer families of Rogers Park. They lived there until 1946 when they moved to Evanston, Illinois.

Their son Stanley went to Lane Tech High School in Chicago and then went to work for his father in the loft building. There was an elevator accident and Stanley fell six floors. He was the only one that survived and he had a broken ankle and pelvis. This was in 1911, and he was very lucky to have a good orthopedic surgeon. He was in the hospital for several months and when he received compensation, Jenny insisted he use the money to go to a university. He enrolled at the University of Illinois at Urbana, Illinois and obtained a BS in mechanical engineering in 1916. He also went to court and changed his name to Stan Lee Hanssen. He obtained a job in Boston working as a field inspection engineer for the Factory Mutual System at $65 per month. He stayed with them until he joined the US Navy in late 1917.

In the mean time Hanson Brothers grew. In 1912 they started to make package and postal scales. In 1917 Marius received a patent for hanging scales. In 1914 they outgrew the premises in downtown Chicago and built a small two story factory at 525 N. Ada Street just north of Grand Avenue. Marius rode the streetcar on Grand to the Northwestern RR Station where he took the train home to Rogers Park. He never learned to drive a car.

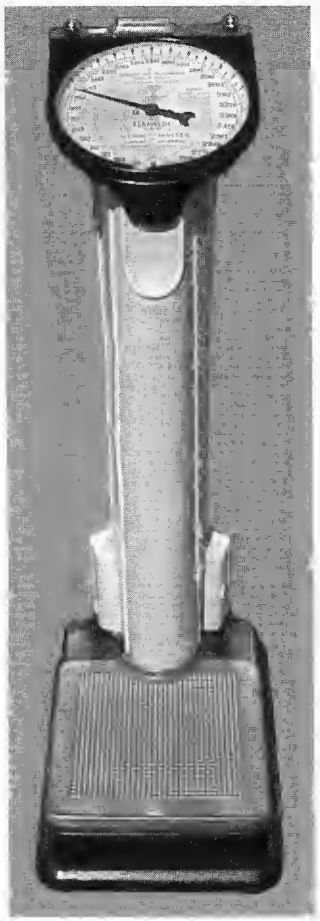
Stan L. served as an engineer on a freighter in the US Navy taking a ship with munitions to France. His ship was fired on by a German sub, but luckily the torpedoes missed. The ship returned to the US where he was discharged. He entered the Naval Reserve as an ensign.

After Stan L. returned from war he married his sweetheart Esther Benzies in July, 1919. Marius his father, prevailed on him to join him in the business. Stan L. was reluctant at first but as a Factory Mutual inspector he had visited some of the large competitors' factories in New England. He decided his father's methods were pretty good, so he joined the business.

Stan L. soon realized that his father's business really had no organization to promote sales or marketing. Somehow by word of mouth, the company called Hanson Brothers Scale received orders. There was no organized selling. In those days products went through hardware wholesalers and department stores. If a company sold to Sears or Wards, the wholesalers in many cases, refused to do business with you. In 1920, Hanson started to make baby scales.

Tragedy struck in 1922. William Hansen, Marius' young brother and partner, developed acute appendicitis, which developed into peritonitis and he died. He had two daughters and a son who were not in the business. Marius with Stan L. got legal advice and set up a corporation called Hanson Scale Company. To settle his brother's estate, and provide for his family, William's wife was given preference shares in the new Hanson Corporation. His wife moved to California to live.

Things went well for the scale company in the 1920s. Space was needed so a three-story factory and office building were added to the two-story factory. It was also decided to enter the growing market for bath scales and a scale was introduced in 1926. It was a bulky scale built on the Roberval principle out of sheet metal with a cast iron main link or lever. The body of the scale was six inches high with six springs. Stan L. redesigned it dropping the height to four inches and at the same time designed a cheaper and more modern-looking scale called the Petite. The Petite was reasonably successful but the competition was hard with Detecto and Health-O-Meter the principal players. Fortunately the firm had developed baby scales and hanging dairy scales. The kitchen scales were doing well. They started making coin-operated penny scales in 1931 and continued until 1941. Then came the great depression.



Sales volume dropped during the depression, and so did earnings. Then there was the constant request for more dividends from Marius' sister in-law. There wasn't the money to increase dividends. On legal advice, Stan L. was told there was no way that the business had to increase or even pay dividends particularly since the money wasn't available.

Stan L. was running the commercial end of the business while Marius continued to work on developing scales. They were making coin-operated penny scales and a number had been placed in and about Chicago. When the banks were closed by Roosevelt Hanson didn't have enough cash on hand to meet the payroll. To get extra cash they went to all the locations where there were penny scales and were able to gather enough cash to pay the workers.

Figure 4 ≺≺ Hanson made coin-operated penny scales like this one from 1931 - 1941. During the Great Depression, when Roosevelt closed the banks, these scales were serviced in order to provide the payroll for Hanson Scale Company workers.

Review

Honest Weight: The story of Toledo Scale, Bob Terry, 1999, soft and hard bound, 386 pages, 8¼" by 5⅜" 24 photos, ISBN 0-7388-1330-3 and 0-7388-1331-1, Publisher Xlibris. Price $19.45 paperback, $29.69 hardback.

Bob Terry presents the twentieth century history of Toledo Scale. This book almost reads like a novel including mystery, romance, history, and court room drama.

It starts with the early days of the Toledo Scale firm with founder Henry Theobald breaking away from The National Cash Register Company. Then Theobald is kept busy with lawsuits and his fight against dishonest scales. We learn about the 100% club, the top Toledo salesmen in the country meeting annually. If you are from the Ohio or Michigan area, you will recognize many town names, roads, politicians, and companies mentioned throughout this book.

The story is peppered with short paragraphs pertaining to current politics, history and modern technological innovations paralleling the book's time line. This helps to show the time in history as Toledo Scale evolved. Terry goes into great detail about Toledo Scale in the international market, World War II, Plastkon scales, the modern history of Toledo Scale Company up to 1999, and dozens of employee names you might skim over and forget. This book even includes a short chapter about antique scales. The only thing this exciting book lacks is an index.

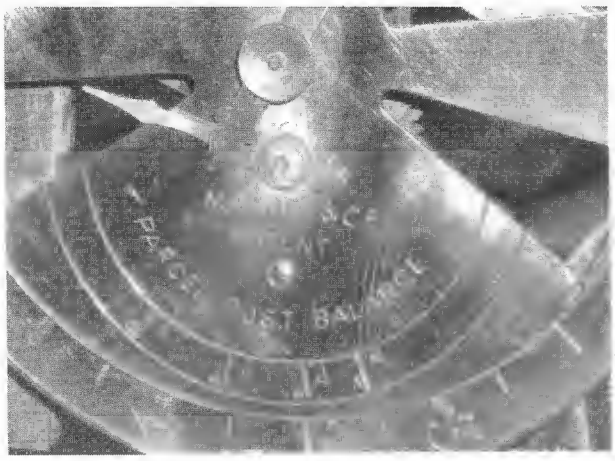
This book is far more interesting to some of us as scale collectors than the title might suggest. It includes the history of Toledo scales from its founding days, through the transition, into the new electronic scales and its merger into Mettler-Toledo. If you enjoy delving into the history of the firms that made the scales that we collect, you will enjoy reading this book. It is very educational.

Bill Berning

Marion & Co. Parcel Scale

The recent acquisition of this item , in addition to being an exciting find for the owner solves a little conundrum that has been with us for some time. Previous examples of this scale are known and bear the maker's mark M & Co. (see EQM page 1257)

The one in the picture was purchased by European member Gordon Meek at a sale at a provincial auctioneer in Britain. The scale was covered in decades of grime but this could not hide the quality of the item.



It had been assumed that M & Co. referred to Marion and Co so it was nice to have this unequivocally confirmed by having the full name of this company marked on the machine in this example. Note the two separate pointers.

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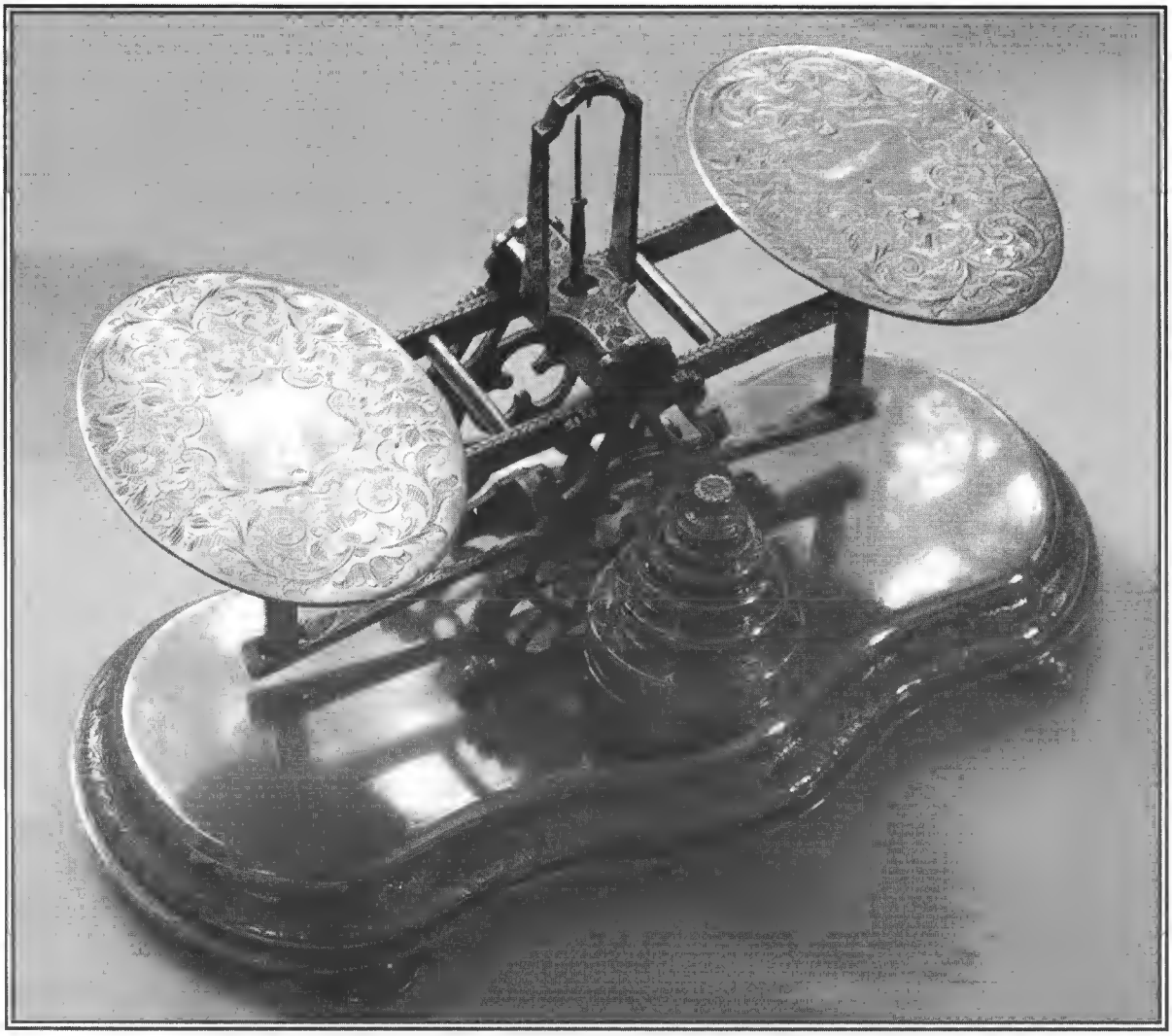

Cover Picture

This postal scale was made in London for private use. People liked to demonstrate that they wrote so many letters that they needed to weigh and stamp their letters without the chore of going down to the Post Office. Hence the demand for luxurious scales to be placed prominently on their desks! This ornate S Mordan postal scale has weights marked P (for Postages weighing 1/2oz each) and F, (thought to be for Foreign or possibly for French, weighing 1/4oz each). Marking in this way seems to have died out by 1871. Although Mordan used the same A frames and legs under his scales repeatedly, the ornamentation was seldom repeated. This is an exceptionally fine example of their "in-house" engraving.

Collection N & J SCARRATT

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Fenland Weighing

BY JOHN KNIGHTS

The Fenlands of Eastern England are moody, magnificent and misunderstood.

Figure 1 ⅄⅄ Map showing the location of the Fenlands .

The outsider, descending into these brooding lowlands, probably sees them as drab in the extreme, with their total lack of geographical feature and the endless miles of flat dark earth cut through by drainage ditches. It is only at sunset, when the great orange ball of the sun seems to sink into the boundless level that the magnificence is revealed to all.

To those of us who hail from these parts and understand the history and process of the formation of the Fens, they rate with great endeavours such as railways, roads, tunnels and bridges that cause us to wonder at their achievement. No less ingenuity, effort and hardship, than went into building of those great works, was needed to drag these previously drowned lands from their inundation. The tangible air of melancholy that persists in this now tamed and fertile country speaks only of the regret of those who once gained their living from the watery wastes and whose way of life was sacrificed in the name of progress.

Among the crops that now thrive in these rich lands, the potato is preeminent and it was this essential element of the British diet that also gave rise to the nearest thing we have, in Britain, to a vernacular style of weighing machine.

In this small country where, from the nineteenth century, scale production was largely in the hands of a small number of substantial makers who produced a largely similar range of products, the low pattern dead weights, or simply, potato scales of the Fenland are something of a novelty.

The major makers marketed low pattern dead weights, of course, which all look suspiciously alike in the catalogues and probably emanated from a factory at Smethwick. These, however, differed substantially from our vernacular equivalent.

The deadweight that featured in the scalemakers' catalogues was a mighty beast with a cast iron pillar, frame and fittings. It had a passing resemblance to a medieval siege engine and even had wheels, on which it could be towed about by teams of carthorses (I exaggerate slightly about the horses). These machines were built for strength rather than portability and were even claimed to be 'indestructible' in some catalogues. They were used on docks and in warehouses for weighing sacks, bales, boxes etc. The low position of the plate meant that goods could be weighed with a minimum of lifting and the wheels meant they could be moved about, to an extent, on a solid floor.

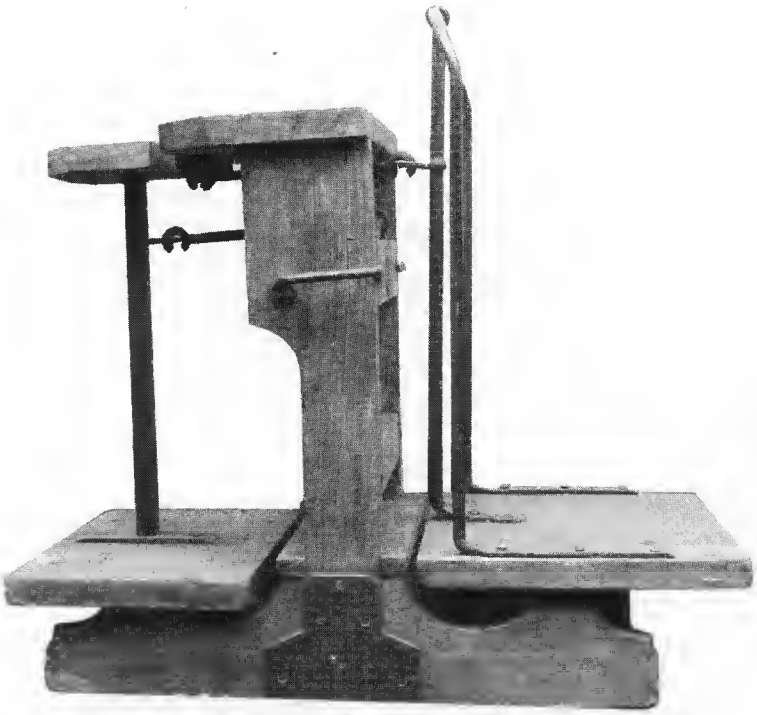


Figure 2 ⮝⮝ Side view of the potato scale.

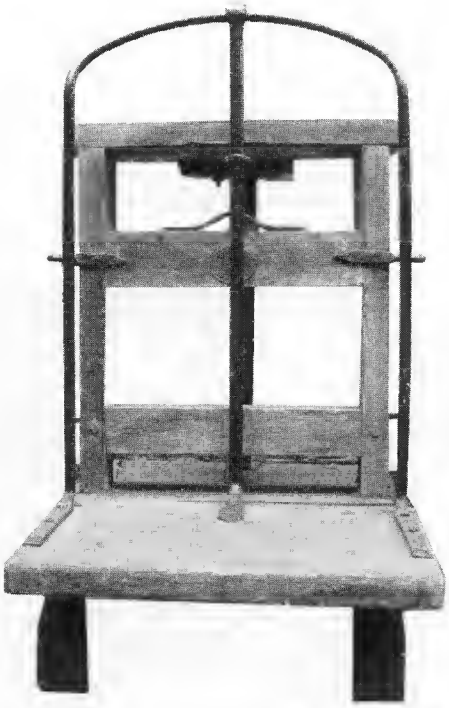


Figure 3 ⮝⮝ Goods plate & sack rail of the potato scale.

In the days when potatoes were bagged up on the farm, they were marketed in two ways, depending upon the time of year. New potatoes were dug in the summer and then weighed and bagged up in the field for immediate sale.

Late, or main-crop potatoes were handled differently. They were dug in the autumn (after the foliage had been burnt off using ecologically friendly substances such as sulphuric acid or arsenic), but were then stored in earth 'clamps', 'graves' or 'pies' (depending upon the dialect) to protect them from the frost. The clamps would be later broken open and the potatoes weighed up for sale to meet demand.

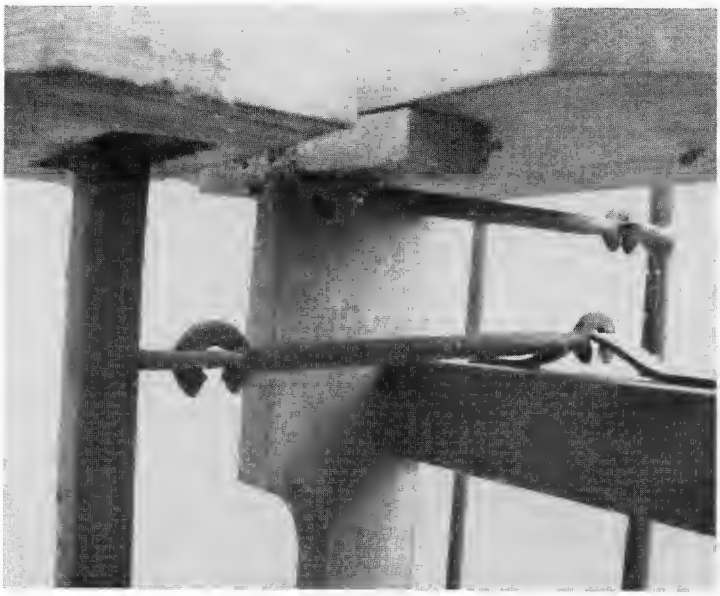


Figure 4 ⮜⮜ Stay Mechanism of the potato scale.

Both weighing operations took place outdoors in dirty or muddy conditions so the heavy wheeled monstrosity from Smethwick was pretty useless. What was needed was a lightweight machine that could be easily manhandled, thrown onto the back of a wagon and set up wherever it was needed.

The potato scale used in the Fens was exactly right for the job. The frame was

Figure 5 ⩓⩓ Weight plate of 3 CWT capacity potato scale made by Gatward.

entirely made of wood, with pieces of steel to strengthen the major joints. Whereas the standard machine had a weighing capacity of 3 cwt, the light-weight was usually only 2 cwt or 1 cwt, which was quite adequate for the required task. The beams were fabricated from steel rather than being traditional, heavy castings, in order to keep the weight down. The aim was to make a scale that was light and easily transportable, and to this end it was fitted with carrying handles instead of wheels.

The stays were sometimes the standard hook and eye design of the accelerating dead weight. More commonly, however, these scales were made to work as vibrating machines and in this case the stays were a simpler design, with a locating eye on each end, which bore on double knife edges fitted to both leg and frame. This meant that the effective length of the stay was different when in compression than in tension and in theory this should have affected the accuracy of the machine. In practice the long leg of the inverted Roberval reduced the magnitude of any induced error to a minimum and they weighed perfectly well, within the tolerances.

Scales made mainly of wood are by no means unusual outside the United Kingdom. The Continental Quintenz or decimal scale very often has only the bare essentials made in steel and European platform scales are often encountered with wooden frames and load plates. The so-called 'orange scale' of Spain is a rudimentary Roberval machine, which is also substantially made of wood. I am sure there are many other examples of a similar nature in other parts of the world.

This mode of construction tends to suggest local manufacture, relying on the simple processes of the artisan and this was certainly true in the case of the potato scale. The manufacture was carried out in a number of locations in and around the Fens and the scales were supplied on a comparatively local basis.

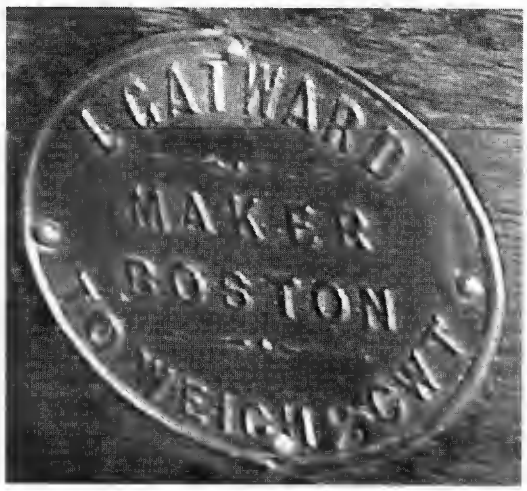


Figure 6 ⩓⩓ Label from Gatward potato scale with capacity of 2CWT.

Thus in the Fens of Lincolnshire, scales made by Tong of Spilsby and Barratt of Boston were the norm, whereas further south, in the counties of Cambridge and Huntingdon, equipment from towns such as Wisbech in the so called Isle of Ely was encountered.

Up to the 1970s, when the marketing of potatoes changed and they were taken from the farms in bulk instead of in bags, the wooden deadweight was found in great profusion

throughout the Fens. At least one of the Lincolnshire manufacturers continued making them into the 1980s and only stopped when the Regulations governing this type of scale changed and imposed more onerous tests of accuracy.

During the early potato season the scales were seen out in the fields where the gangs of 'pickers' were gathering up the crop and the 'riddlers' were weighing them into four stone (1 stone=14 pounds) or hundredweight bags. Later a similar operation took place as the clamps were broken open and the main-crop potatoes were weighed up for market.

Various accoutrements went with the scale, to enable the sacks to be filled quickly and efficiently. Before being bagged the potatoes were riddled through the appropriate sized sieve in order to remove excess dirt and grade the potatoes. These sieves were placed on a riddling frame, which consisted of a steel ring mounted on a metal leg, which had two pointed prongs at the base. These were pushed into the ground so the assembly could be rocked backwards and forwards with the sieve sitting on the top ring.

The acceptable potatoes were tipped from the riddle into the sack, which was suspended from a galvanised steel funnel that was clamped to the back rail of the scale. This, of course, had to be tared off to permit the scale to weigh correctly. This was usually done by placing a sack of earth on the weight side of the scale.

The potato scale was an equal armed machine so it had to be used with the appropriate weights, usually one or two 56 pounds, on the back plate. It may seem strange that the British insisted on using deadweight, rather than proportional weight equipment for this type of work as it meant that heavy iron weights as well scales had to be transported into the fields and manhandled about the site. The decimal scale was however unknown in Britain (the very idea of anything decimal being something of an anathema of course) and the only proportional machine available, therefore, was the Fairbanks type of platform scale.

This was totally unsuitable for the alfresco use required, being heavy, expensive and in need of a flat floor on which to stand. The wooden deadweight was, conversely, light, cheap and capable of use almost anywhere so it was the only practical solution.

As the industry changed and the potatoes were taken away to merchants in bulk, the scales were no longer needed. They were thrown into the back of the barn where they succumbed, over the years, to worm and rot.

The lightness of construction, unfortunately, meant they were less durable than the industrial equivalent; so ones still in good condition are not, now, easy to find.

Figure 7 ⅄⅄ Gatward potato scale with capacity of 2CWT. John Cattle Collection.

Some of those that do still exist can be seen, in various stages of decay, in gardens being used as plant stands etc.

A nice, well preserved example is a very pleasing item, exhibiting that almost organic fusion of metal and wood, which, such composite pieces acquire over the years. Mine is kept safely under the carport, away from the ravages of the weather. It was made by Gatward of Boston; one of the lesser-known makers. It is unusually, a 3cwt machine and therefore more heavily made than the smaller models, which may account for its comparatively good order.

The harvesting of potatoes is now a largely mechanised operation and we no longer see the hordes of pickers and riddlers out in the open fields, but in its day, it was a spectacle worthy of description by Thomas Hardy or depiction by Breugel.

The occasional wooden deadweight may still be encountered in use, in the back premises of a nursery or garden centre but for the most part these have also passed into history.

Potato Scales

BY DIANA CRAWFORTH-HITCHINS

Day & Millward sold these potato scales in 1889. 'Potato scales' were intended to be used in the front of the shop. They sold other potato scales called huckster scales or vegetable scales (special) that were intended for use on market stalls, not illustrated, but at lower prices than mentioned below. Potato scales for use in the back of the shop were not sold by Day & Millward, but would have been bought from manufacturers dealing in more robust potato scales, of the same design as the Gatward above.

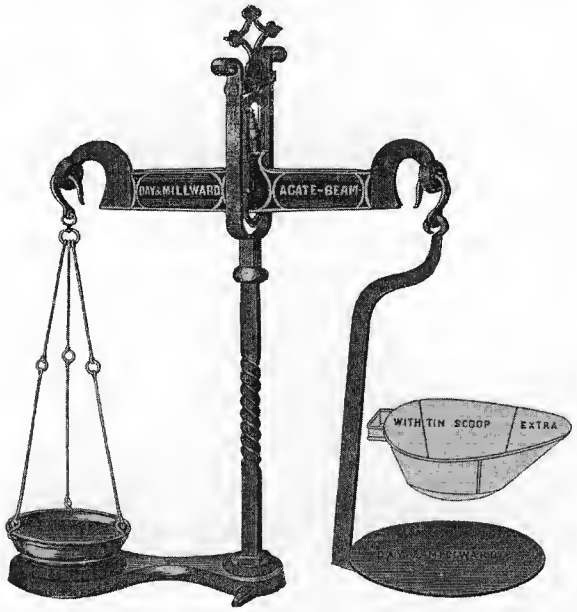


Fig. 1. AA The chunky beam (sizes 12 inch to 24 inch, prices 14 schillings to 40 schillings- respectively) on this Stand Scale had the most robust swan-neck ends available, but had smart gilt beam, iron crank, agate bearings and brass chains.

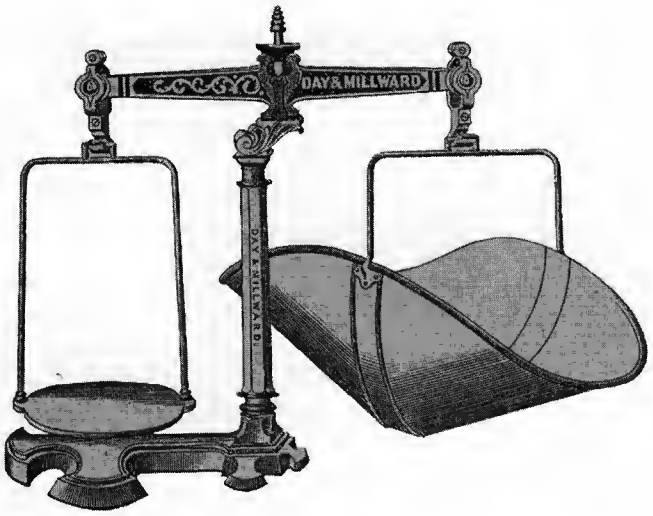


Fig 2. AA The New Pattern Vegetable Scale with Steel Centres, Gilt Beam, Japanned & Gilt Pillar & Foot. The size was defined by the capacity of the scoop, being 1/4 peck up to 2 pecks, price 10 shillings to 26 schillings respectively. Note the kink in the pillar, bent to accommodate the sheer bulk of the scoop.

W & L E Gurley Troy, N Y

BY KURT BEYREIS

During the 19th Century the upper Mohawk and Hudson River Valleys in New York State were an ideal place for industry and innovation. Some of the industries around Troy, New York included clothing manufacturing, iron and steel foundries, scientific instruments production and bell manufacturing. Several factors contributed to this: (1) an abundance of water power, (2) educated engineers (Rensselaer Polytechnic Institute located in Troy, New York was the first English speaking college to give engineering degrees), (3) water access to the markets of the east coast including New York City and the growing markets in the developing mid-western and western states via the Erie Canal system, and (4) an influx of people from New England who were both entrepreneurial and well educated.

Figure 1 ⮝⮝ Gurley Factory c 1862.

William Gurley, the son of a transplanted New Englander and a graduate of Rensselaer, started the production of scientific instruments in Troy, New York, in 1845, in partnership with Jonas Phelps. Phelps was bought out in 1852, by William and his younger brother Lewis, also a Rensselaer alumnus, to form W & L E Gurley. The brothers utilized the factory concept for the production of scientific instruments and sold their products with very shrewd marketing. The great Troy fire, of 1862, destroyed the Gurley factory along with most of Troy. They quickly rebuilt the factory using all of the latest innovations in factory production techniques and the best manufacturing practices they had seen. As a result they were able to produce high quality instruments at about half the price of their competitors. One of their product innovations was the use of aluminum in transits to reduce weight. The first quasi-commercial use of aluminum in this country was for a transit that Gurley manufactured and exhibited at the 1876 Philadelphia Exposition. It wasn't until ten years later that the Hall Process was developed to smelt aluminum by electrolysis and the price of aluminum dropped below that of gold and platinum. It wasn't until then that aluminum was put into general use for commercial products.

Figure 2 ➢➢ William Gurley. Photo © Institute Archives and Special Collections of Rensselaer Polytechnic Institute, Troy, NY 12180. Used by permission.[1]

Figure 3 AA c 1923. These weights came in a strong wooden box, carefully lined to prevent scratching their pristine surface.

After William died in 1887, Edward Arms, who remained Gurley's Chief Engineer for more than 65 years, provided much of the push for technical innovation while Lewis handled the marketing side until his death.

During the remainder of the 19th century and into the 20th century they became the largest producer of surveying and engineering instruments in the world. In the same period they expanded their product lines and entered several other businesses.

In 1903, only two years after the establishment of the NBS[2], W & L E Gurley added a weights and measures department. In the same way they approached most of their other businesses they decided to concentrate on becoming a preeminent supplier in a niche market. They chose to concentrate on and provide only standard weights, scales, measures and other equipment for inspectors, sealers and inspection labs and eventually supplied standards to nearly 2/3 of the United States Weights and Measures Agencies.

It appears that they worked quite closely with NBS and sold a full line of Class A, B and C Standard Weights as specified by NBS. The class A weights shown in figure 3 are one piece, non-adjustable, gold-plated Tobin bronze.

In 1906 they published the first edition of *Gurley's Handbook of Weights and Measures for the Use of Sealers*, similar to the one they had successfully published for their survey and engineering instruments. It became a defacto reference for sealers and undoubtedly helped to sell their products to the Weights and Measures authorities in the United States. While the handbook was primarily a catalog for all of their scales, weights, measures and equipment for sealers, it also included much of the necessary information for a sealer inspecting scales, weights and measures. The manual was published through the fourth edition in 1912. After the printing run was exhausted it was replaced by a much smaller periodic printing of *Bulletin 1500* which was little more than a catalog for Gurley weights and measures products.

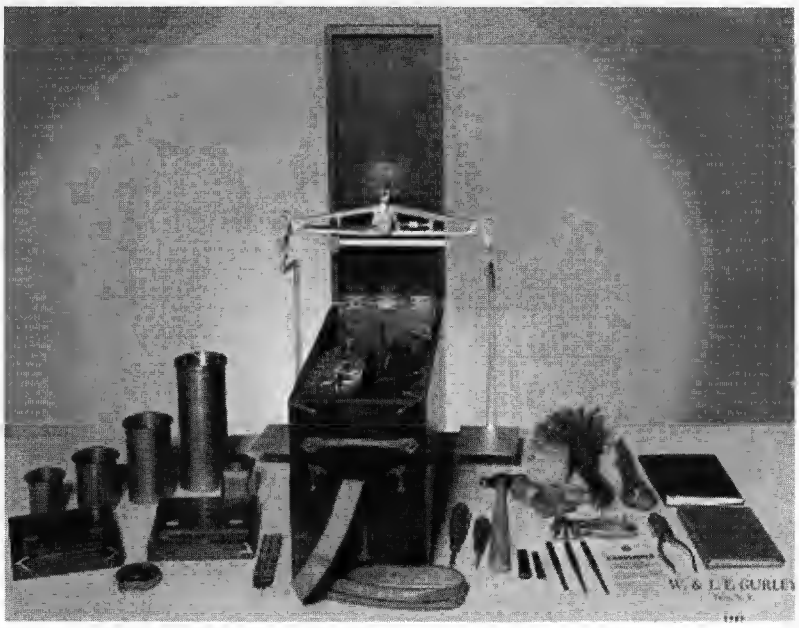


Figure 4 AA c 1939. This Massachusetts Pattern sealers kit has flat pans and some of the parts of the scale were made from aluminum alloys.

While Gurley sold several different kinds of scales and kits for the sealers, the two discussed below were developed and broadly marketed. The Massachusetts Pattern was an early design. Shown in figure 4, it was very popular with sealers because it used an aluminum alloy beam and was attached to the box during use, contributing to its portability and stability. These early versions of the Massachusetts Pattern kit had round pans and some of the parts of the scale were nickel-plated brass. Later versions made more use of Aluminum alloys and had flat pans. Starting in 1908 several variations of the Massachusetts Pattern were sold including a choice of either gold-plated weights for more accuracy, nickel-plated brass weights or lacquered brass weights and/or a larger box with liquid and dry measures included in the weight kit.

A later test kit that was used until Gurley went out of the scale and weight business in the late 1960's is shown in figure 5. This "reweighing kit" probably was the one that had the greatest production and was often used by the US Food and Drug Administration. It was usually sold with a ten pound capacity scale and six pounds of nickel-plated brass weights ranging from 2 pounds down to 1ounce. These weights were replaced by stainless steel ones in later versions of the kit produced after World War II. This design made extensive use of aluminum alloy in the beam, pans, scale stand and pan hangers making for a lighter portable scale. Unlike the Massachusetts Pattern scale which was attached to the carry box this scale was designed to be quickly set up with a tripod stand on a countertop or moved wherever it was needed. However the beam construction and scale capacity were identical for both kit types.

The boxes Gurley produced for most of their products were very distinctive, almost always made of mahogany, and used Eagle brand locks. With the exception of iron weights, all of the Standard Weights were produced in house with an eye to maintaining the highest quality. It is very difficult to date these Gurley scales and weights since the basic designs did not change much over the years. However, it appears that Gurley made "tweaks" to the designs that were not always noted in their catalogs. Two noticeable improvements, the addition of a zeroing screw and nut, and adding a tare weight, beam and poise to the original balance beam, were offered as options to the basic scale. Another major change was the use of stainless steel weights.

W & L E Gurley continued in the weights and measures business until the late 1960s. The company was purchased by Teledyne Corporation in 1968, was sold to private interests in 1993, and now operates as Gurley Precision Instruments, Inc.

Thanks to Bill Skerritt who provided some of the pictures and details of the history of the W & L E Gurley Company.

Notes:

1. Photo © Institute Archives and Special Collections, Rensselaer Polytechnic Institute, Troy, NY 12180-3590.

2. NBS-National Bureau of Standards, now National Institute of Standards and Technology -NIST.

The Editor thanks Institute Archives and Special Collections, Rensselaer Polytechnic Institute, for allowing use of the photo.

Figure 5 ⩓⩓ These Gurley reweighing kits could be quickly erected for use by inspectors.

Defiance Machine Works - Proportional Balance

BY CLIFF LUSHBOUGH

Once in a while the way you get a scale is as interesting as the scale itself. That is certainly the case with this one. So, here goes the story. A few days before our ISASC get together in Minneapolis I received an e-mail from Steve Beare. He had received an inquiry from someone who had an unusual scale for sale. Steve, knowing my interest in unusual "things" wanted to know if I would be interested in the scale. The answer was obviously, yes! Upon arriving at the ISASC Convention, Steve presented me with a patent and pictures. It took just a few seconds to realize that this was a scale for me.

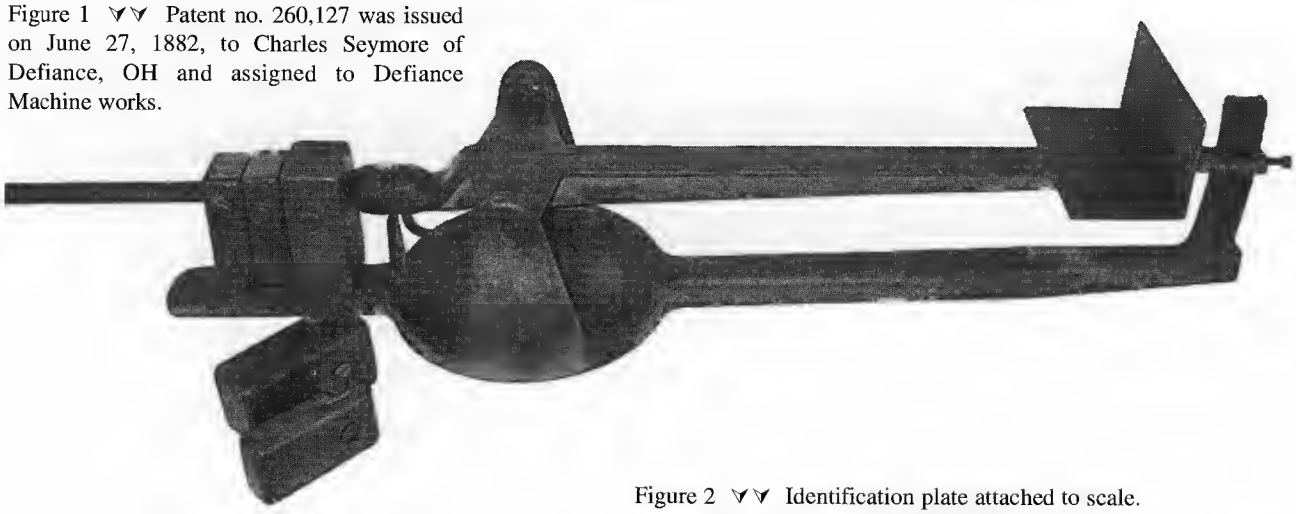


Figure 1 ⋎⋎ Patent no. 260,127 was issued on June 27, 1882, to Charles Seymore of Defiance, OH and assigned to Defiance Machine works.

Figure 2 ⋎⋎ Identification plate attached to scale.

Upon returning home it was time to "get with the program" and get this scale. Contacts with the owner established a purchase price plus S & H[1]. It then occurred to me "Just how big is this scale?" The patent gave no indication as to the size. The answer came back "About 40 pounds and about 40 inches long." At this point I wondered if the right decision had been made. "What the hey, send it", was the message to the seller.

While waiting for this heavy package to arrive I started looking for information on the internet. Google[2] sent me to a web site that had a picture of the scale in an advertisement by the Defiance Machine Works in Defiance, Ohio (figure 4). It seems that the buyer (me) and the seller had contacted the same web site: Oldwwmachines.com. Conversations by phone and e-mail were had with both parties. During this same period of time contact with the Defiance, Ohio Tourism & Travel Bureau was made. Information was received about the Defiance Machine Works and the name of a gentleman, Elmer Myers who was a tool engineer and plant manager during the 1940s.

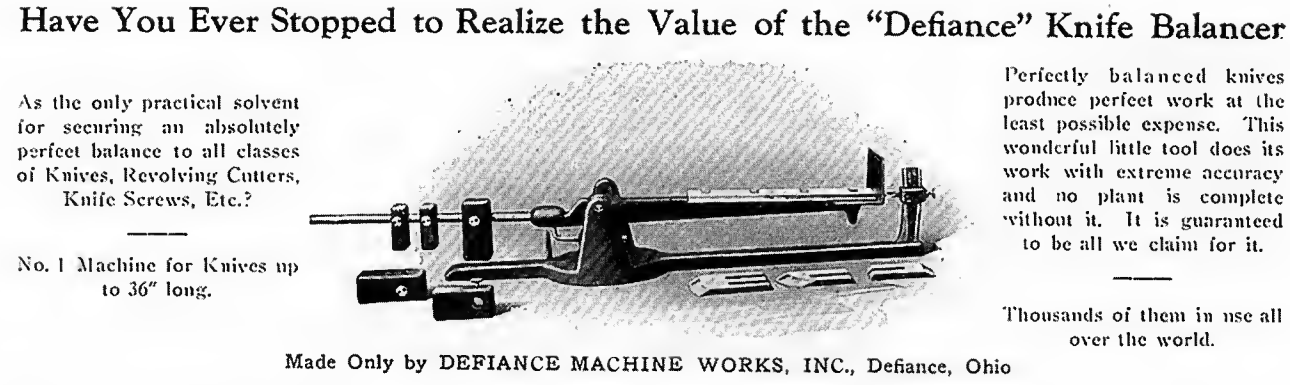


Figure 3 ⩓⩓ Old advertisement for Defiance proportional scale.

The Defiance Machine Works provided wood working and steel working machinery for consumers in the United States, Canada, and other countries of the world for 100 years. It is interesting to note that, at this time the gold discovery in California in addition to Union and Confederate governments were demanding more equipment than wagon builders, wheelwrights, and blacksmiths could provide. The Defiance Machine Works had been manufacturing some of the machines to produce the needed items. The company with these highly specialized machines soon dominated the American and world market. Many of these machines had large cast iron frames weighing thousands of pounds. One 26 inch surface planer is mentioned in their catalogue as weighing 7000 pounds.

The large wood working machines requirecl large cutting blades weighing many pounds. Also, the machines turned at high speeds in the 500 to 2000 rpm[3] range. The blades in the cutting heads whether there were two, three, four or more needed to be exactly the same weight. The weighing of cutter blades and getting them the same weight was not a problem. Grinding them would have been easy. However, with the operating speed that these machines required, any imbalance within the knife itself needed to be addressed. This balance was designed to perform that operation. The pictures that are from the patent and photos will help describe the procedure.

It is time now to describe the balance. The scale arrived and with my first look at the scale, it was obvious that some research was going to be necessary. It is an unequal arm scale (figure 1) with the beam being about 40 inches long. The frame is heavy cast iron. The casting is very well done. There are two large and three small weights. Each weight has a hole drilled in it and a knurled bolt that is used to tighten the weight to the beam. The beam and the weights have

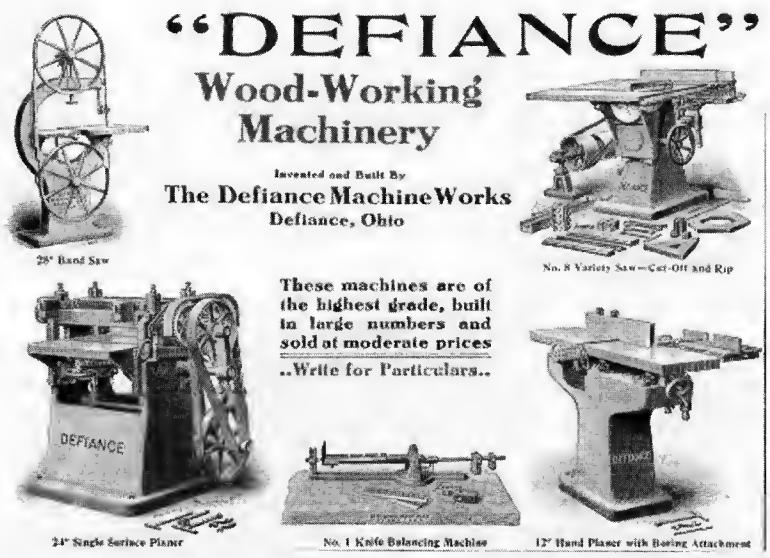


Figure 4 ⩓⩓ This 1909 advertisement was in the American Carpenter and Builder Magazine. © www.oldwwmachines.com. Used by permission[4].

no markings. All parts show excellent machining and attention to detail

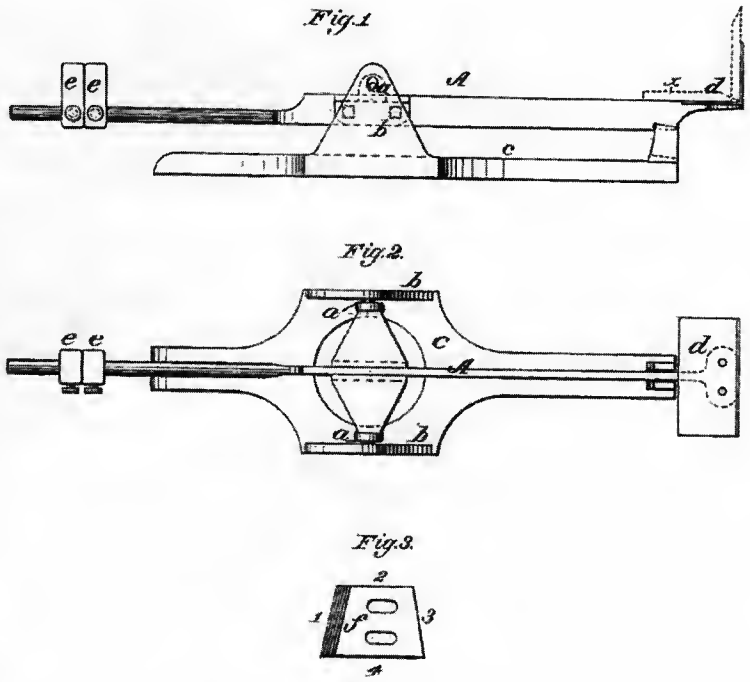


Figure 5 ⅄⅄ Patent drawings from US patent number 260,127.

The scale was to be an improvement to the typical method of weighing the cutter knives. The patent (figure 5) states; "*the object of my invention is to obtain an indication of the differences in weight between corresponding parts of two or more knives, whereby an accurate distribution of weight in the cutter-head may be obtained.*[4] The method of determining these differences involves rotating the cutter knives on the beam (position d Fig. 1 & 2). A portion of the patent will describe the process. *Let it be supposed that two or more knives such as shown in Fig. 3 are intended to be fastened to one cutter head. Each knife is placed in succession on the scale-platform d, with its face (cutting edge) against the vertical wall of said platform, and is balanced by the weights e, e, at the opposite end of the scale-beam. Normally the weights would be attached so that the heavy end is up (Fig. 1 e,e). This is in order to have the entire mass of weight-beam and knife poised near the center of gravity, and thereby oscillate more sensitively. If by this test they all appear to be of the same specific weight, then place them each in succession with their backs against the vertical wall, in which position they may still appear to be of the same specific weight. Then place them each in succession flatwise upon the platform, as shown by dotted lines x in Fig. 1, in as many different positions as they are susceptible of being placed in (that is 1, 2, 3 & 4 in Fig. 3), noting and reducing by an indefinite of trials the edges which are found to be of excessive weight until they are all reduced to the same weight in their corresponding parts, when they will consequently all be of the same specific total weight.*[4]

The process of getting the knives balanced was certainly a very labor-intensive task, but very important. There is no indication given in the patent as to how the knives were brought to equal weight. It would have to be assumed that they ground, filed, or drilled in places away from the knife edge. The individual doing this task must have been an artist with metal. A conversation with Elmer Myers indicated he does not recall seeing the Proportional Balance. He does, however, recall the use of a machine that would spin the complete cutter head with knives and would indicated an imbalance on the knife and show where the imbalance was. A page from their catalog shows one of these machines (No. 1 Seymour Patent Rotary Balancing Machine) (figure 6). It certainly was not a balance with a beam and weights.

As the writing of this article continued, more information appeared that indicated the importance of

the Defiance Machine Works to the economy of the United States. It certainly was a company that produced a large number of balances. Not only were they used in their machine manufacturing, but other wood working companies purchased the balances as well.

It occurred to me with the importance of Defiance Machine Works in Ohio that there might be some philatelic material available. This cover (envelope), purchased recently at a stamp show, (figure 7) shows the factory; however, it cannot be verified that it is really the factory. No other material has been found.

For those of you who are interested in greater detail of the balancing process a page from one of Defiance Machine Works catalogs is included (figure 8).

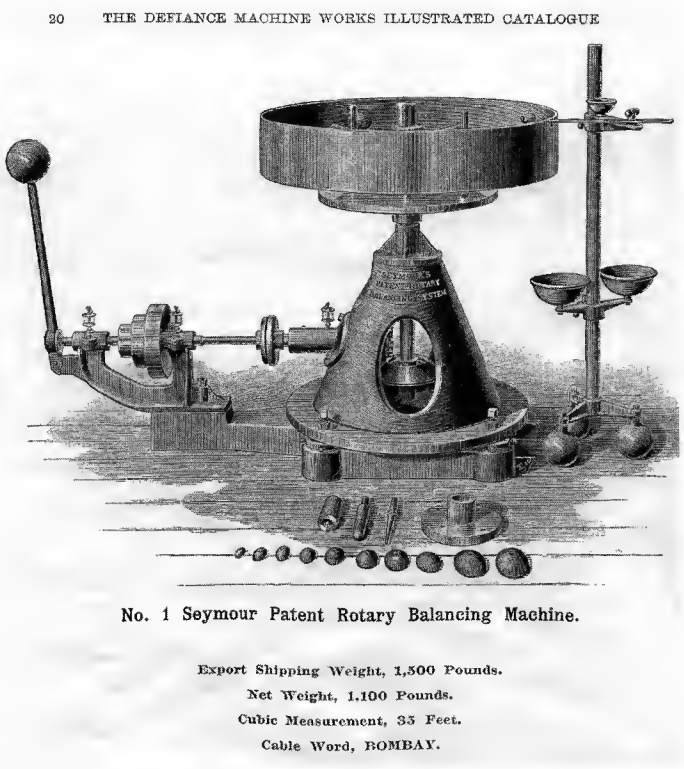


Figure 6 ⅄⅄ No. 1 Seymour Patent Rotary Balancing Machine.

This proportional balance uses the balance idea, but does not give actual weights. It is concerned with the ability to sense the change in the "center of gravity". Other balances have this ability that have other uses. Two of them come to mind, the bowling ball scale, and a scale used in the manufacture of bullets in guns. There may be others. Any information on this topic would be appreciated. There might be an article coming if more information can be located.

Acknowledgements:

The author wants to thank most of all: Elmer Myers, tool engineer, plant engineer for Defiance Machine Works, for the information about D. F. M. thru phone conversations and printed material.

The author wishes to thank, also, the following for providing some information used in this article.

Kelly Worline, The Greater Defiance Area Tourism & Visitors Bureau, Defiance, Ohio

Mike Joslin, historian, Old Woodworking Machines at www.oldwwmachines.com

Michael Paxton, Marietta, Ohio, former owner of the scale.

Notes:

1. Shipping & Handling
2. Google is an internet based search engine or program.
3. RPM is revolutions per minute.
4. US Patent # 260,127.
5. *American Carpenter and Builder Magazine* Mar. 1909: 703.

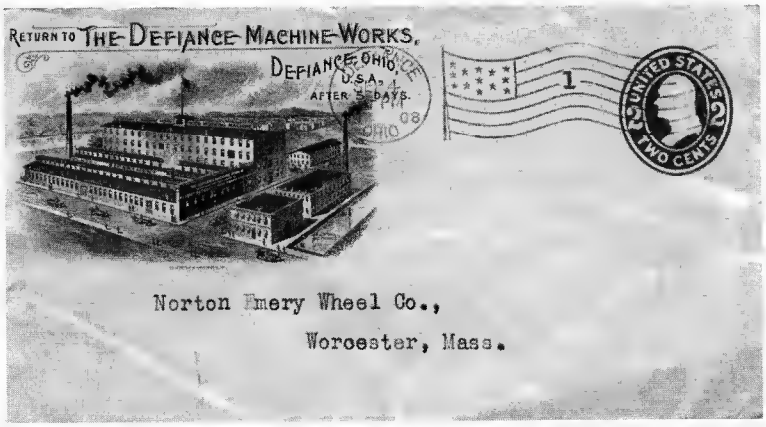
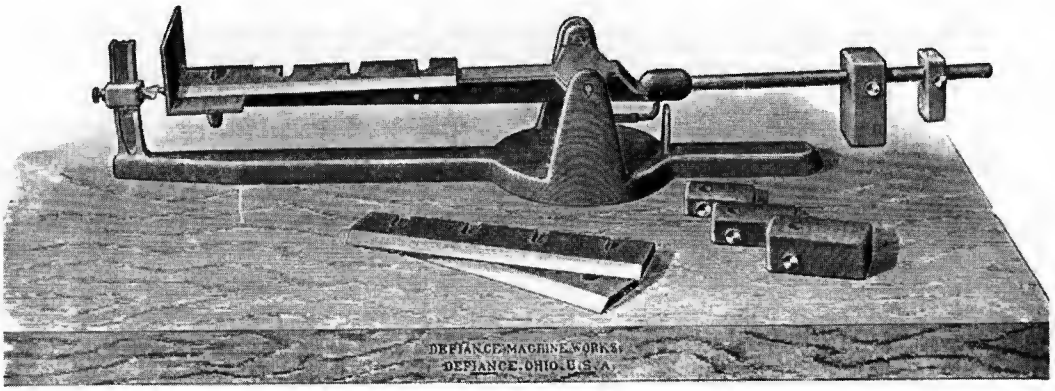


Figure 7 ⅄⅄ Mailed from Defiance with a flag cancel on September 4, 1908.



Patent Proportional Knife Balancing Machine.

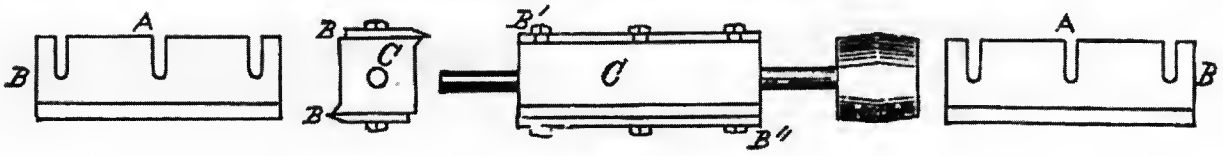


Fig. 1.

THIS ENGRAVING represents the most perfect machine yet produced for balancing moulding knives, planer knives, revolving cutters of every shape, knife screws, etc.

THIS MACHINE is too well known to the users of machine knives to require a lengthy description.

IN DESCRIBING ITS USE, let AA, Fig. 1, represent two knives, which are to be fastened on to the cutter head C. Let it be supposed the knives are of the same specific weight, but that there is an excess of weight at the opposite ends, BB; then, when revolving on the head, they will cause a violent jarring or "throwing" by reason of the excess at B′ and B″. The knives could be reduced to the same specific weight by the aid of a common grocers' scales, but that would not attain the object; by the use of the Proportional Balancing Machine, the position, as well as the amount of excess of weight, can be ascertained, so that in reducing the knives to the same specific weight, they may be made to agree in their corresponding parts. The method hitherto used is by reducing pairs or sets of knives to the same dimensions, and, by aid of common scales, to the same specific weight; but so great are the differences in the density of the parts of even the same knife, that a still running set of knives is but an accidental result.

IN OPERATING, let it be supposed that two or more knives are intended to be fastened on to one cutter head, rotating at a high velocity, and that it be conceded that they must not only be of the same specific weight, but must agree in their corresponding parts. Place each knife in succession on the platform of the Balancing Machine, with its face toward the end board, with a suitable weight at the opposite end of the beam; if, by this test, they all appear to be of the same specific weight, place them each in succession again, with their backs against the end board; they may still appear to be of the same specific weight; place them each in succession flatwise on the platform, in the many different positions of which they are susceptible, noting and reducing by an indefinite number of trials the edges, which are found to be of excessive weight, until they all are reduced to the same weight in their corresponding parts. They will also then, of course, be of the same specific weight. The balance weights are made oblong, so that by putting the heavy end up, the entire mass, consisting of weight, beam, and knife, may be poised near its center of gravity, and thereby oscillate more sensitively. If, however, the object to be balanced be very heavy, the weight must hang down, or the upper portion of the mass may preponderate. It will be seen that the operator can make the poise more or less delicate, according to the varied positions of the knives to be balanced.

No. 1 MACHINE for balancing knives up to 36″ long.
No. 2 MACHINE for balancing knives up to 48″ long.

Figure 8 AA The balancing process of the Defiance Machine Works proportional scale.

Hanson Scale Company, Part 2 BY STAN HANSSEN

Editors note: This is the second part of a three part article.

In 1933 Marius Hansen, my grandfather, applied for a patent on a better bath room scale using a compound lever system. The mechanism for this scale enabled Marius to build a rather attractive up-scale penny scale (fig. 1B). In 1935 he applied for a patent on a flat bath scale to compete with Detecto. Both patents were granted.

In 1938, he had an idea for a straight spring balance (figure 2) for which he was granted a patent. This turned out to be a real winner! The Texas sales agent got the state of Texas to approve it for use in weighing cotton. Thousands of these scales were made as they replaced the steelyards that were used in the cotton fields. These scales created great volume for the company until the cotton picking machine replaced the need for cotton pickers. The scale was a great improvement on the straight spring balances that were on the market.

Fig. 1 A & B ⩔⩔ Two different Hanson coin operated scales were produced. The earlier one (left) was based on patents D78,751, 1,838,941 and 2,003,360. It's platform is 7¼" off the floor and is only 7½" deep making it rather frightening to stand on for weighing. Chris Steele collection. Later patent (right) D94,140, of 1934 was issued for the up-scale version right. Its platform, by comparison is only 3¾" high.

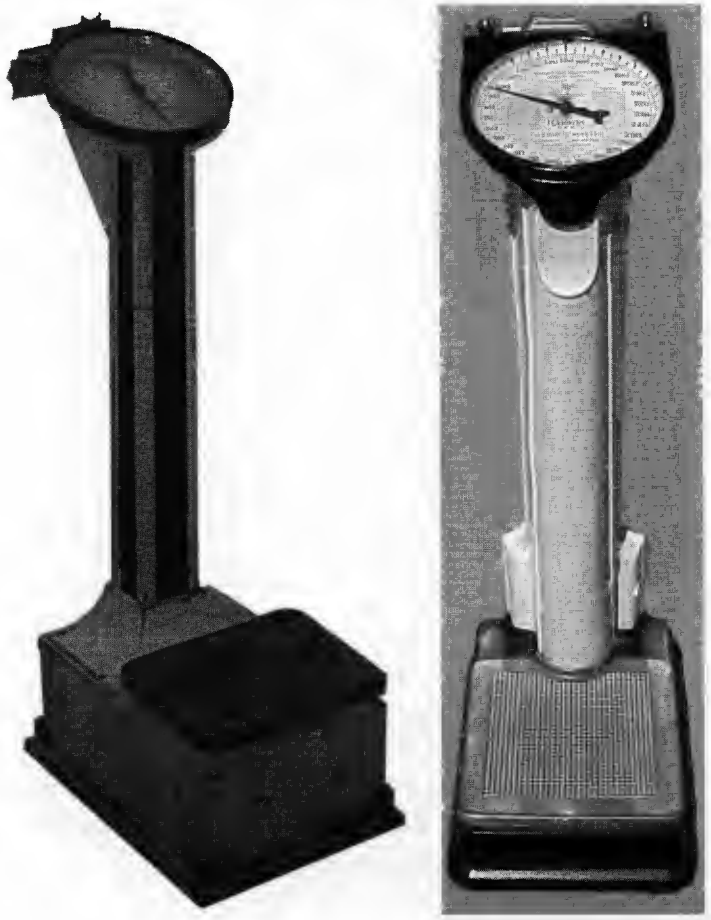


Fig. 2 ⩓⩓ This Viking straight spring balance, in the 160lb capacity version was approved for use in weighing cotton in Texas. Hanson sold 40,000-50,000 of these "Texas Cotton Scales" every year. The two-hundred pound capacity model 8920, illustrared here, was sold in other states for farm use. These scales were also sold in 100, 50, and 25 pound capacity models.

These were the first hanging spring scales to incorporate an adjustment screw on the bottom of the case to compensate for wear on the spring. The Marius Hansen patents for these scales no. 2,296,923 of Sept. 29, 1942 and no. 2,299,980 of Oct. 27, 1942 are the only improvements that were ever made on the Salter and Chatillon spring balance. Hanson Scales Condensed Catalog No. 26 of June 1, 1950.

During the 1930s, insulin became more available for treating diabetes. A firm called Chicago Dietetic Supply approached the company to build a food weighing dietetic scale. This was done and this scale (figure 3) became the standard for weighing food portions in hospitals and for home use.

While the company had farm, kitchen, postal scales, baby scales, Marius continued to work on designing flat bath scales to compete with Health-o-Meter, Detecto, and Borg, which had entered the market with a flat scale. The Brearley Company of Rockford, Illinois, also introduced a scale called the Counselor. None of the flat scales designed by Marius were very successful. Marius was a good inventor but he had a stubborn streak. He did not believe in a small pinion so this prevented him from building a slim or very flat scale. Greenleaf approached them with an offer to have them make his flat scale. Marius turned him down. This scale became the Borg scale. It had a small pinion.

During the 1930s, Stan L. became very active in the forming of the National Houseware Manufacturers Association (NHMA) and was the association's first president in 1939 and later in 1953/54. The first trade show was held in the Palmer House Hotel in Chicago. Soon we were at war and trade shows were abolished. Material to build products was limited by priorities and other restrictions.

When World War II started, bath, kitchen, and postal scales were not allowed to be made. Fortunately material priorities became available for industrial and farm scales. There was not enough work for the company. It did not have screw machines for which there was plenty of contract work to be had.

The company scrounged around and found a man who had steel priorities to make steel tool boxes. The company contracted to make these for him. They also got a contract to make steel grommets for the army and milled steel blocks for tank gun sights. With these contracts and the farm scales the company kept going. Marius continued to work on bath scales and received a patent for a drum type bath scale that was never put into production.

When the war was over sheet steel was hard to come by. In 1946, Stan L. made the decision to use the material that was available for the prewar line of products. They could sell everything they could make until 1948. As business was booming they needed warehouse spacc. Prior to thc war they had rented warehouse space on Goose Island in Chicago. A 20,000 square foot two story building was added to the three-story office building. A proper shipping dock, which they did not have, was built.

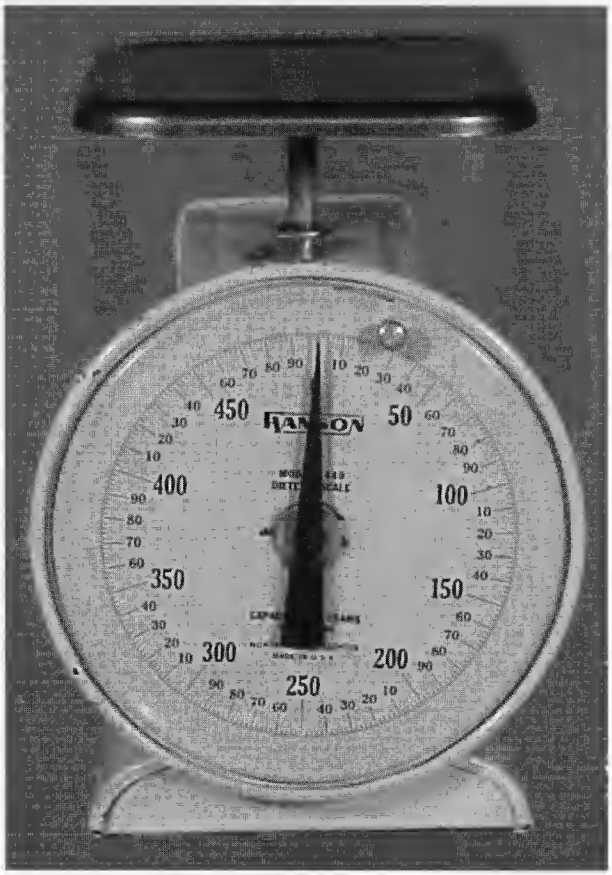


Fig. 3 A Model 1440 Dietetic Scale made by Hanson for Chicago Dietetic Supply. This model was equipped with a rotating dial so that a user could tare for a bowl or other container. The case was made of steel and the plate was stainless steel. Hanson sold about 2000 of these scales per month.

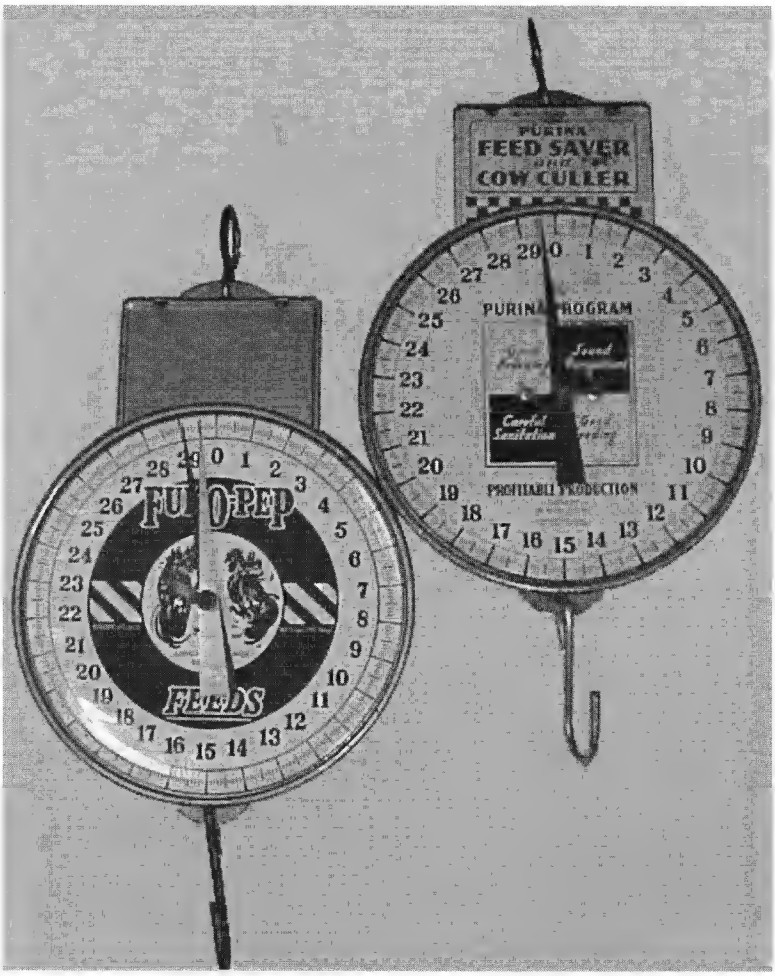


Fig. 4 ⩓⩓ These advertising dairy and farm scales were made by Hanson in the late 1940s and early 1950s. Ralston Purina was one of Hanson's largest accounts for this type of scale. Non-advertising scales made like these were allowed to be made during WWII since they were for farm use.

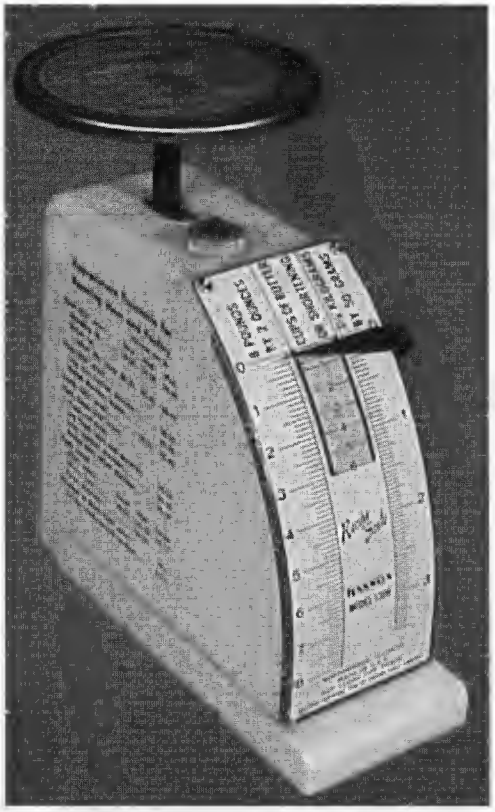


Fig. 5 ⩓⩓ The Hanson "Recipe Scale" came in the colors of yellow, red, white, pink and aqua to match modern kitchens of the late 1940s-1950s. They were made of plastic with a capacity of 8lbs or 3½ kg. Some models had approximate equivalences and meat timetables printed on their sides. They also had center graduations for weighing butter by the cup. The same body style was used for a postal scale made from mottled gray plastic.

In 1946, I joined the firm full time. I had worked for Utah Radio Products after my discharge from the US Army and was at Northwestern University working on an MBA. One afternoon, as I returned from class, my father was at the house. The companies' office manager (purchasing agent) had sent in his notice. My father asked me to join the firm and take over for a short while. I was reluctant; I wanted to complete my MBA. Father was very persuasive and said I could finish at night school. Several days later I said I would try. Needless to say I did not like night school and quit after one semester. After a few months I found I liked the scale business and decided to stick with it. Marius had a stroke in 1950 and died at the age of 85.

The business grew slowly but we needed new products. We improved the postal scale line and also retooled the line of spring balances of which the cotton scales were so important. In 1953, I convinced my father we needed a new one-story modern factory. He was not opposed to this, as he had always wanted to move out of the City to a modern plant. We found a 20 acre industrial plot with a rail siding in Northbrook, Illinois. A modern, one floor 42,000 square foot building was planned on 8 acres of

Fig. 6 ⩓ The 1941 Hanson catalog featured this "Silver Arrow" model 777, bathroom scale. It measured 8" wide by 12¾" long and stood 3¾" off the floor. Patent no. 2,242,949 for this scale was issued to Marius Hansen on May 20, 1941.

the Northbrook plot. At this time I believed there was no long-term future in the products we had and decided we should have a bath scale. I convinced my father we should do this and told him I could design one, which I did. There were four strong bath scale manufacturers and the market was about 2,600,000 units per year. I thought we could get 10% of the market without too much trouble. We hit the market in 1954 with my scale at the same time competition came out with new models. It was a tough market. I soon realized my scale used too much material. It was a real learning experience for me in both marketing and design.

Fortunately, the cotton-picking machine had not come into general use so the cotton scale business continued while we were struggling to sell bath scales. Postal rate changes also helped the postal scale business. There were lots of changes going on in the market place at this time. NHMA dropped the hotel, trade show format and moved to Navy Pier. NHMA also used the Stockyards International Amphitheater for a short time for the trade shows.

It was at a NHMA Navy pier show that a group of foreign buyers stopped in to look at our scales in the late 1950s. There were five foreign buyers from Europe escorted by a member of a buying group from New York. When they left we had an order for 5000 scales for Sweden and 500 for Holland. Our interest

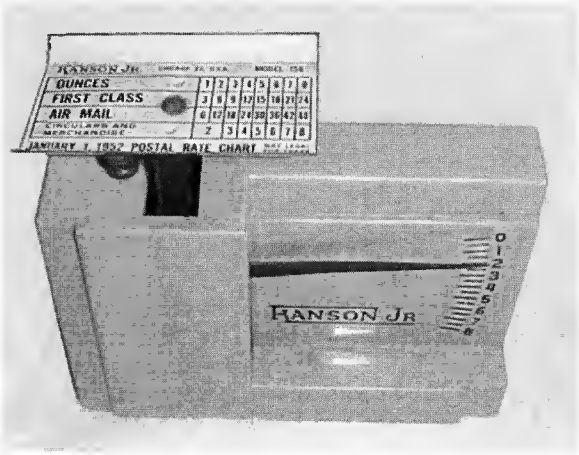


Fig. 7 ⩔ Hanson Jr., model no. 158, postal scales like this one were produced in the 1950s. They were made from gray plastic and tin with a spring mechanism. During production of these scales postage rates changed several times. In 1952 the postage rates were printed on the letter plate but later versions had the rates on the face. Model 1562 the "Desk Post Office" had a black hinged box with two sections, attached to its base. One section was marked "loose stamps, stickers, clips, pins, and rubber bands." The other held a roll of stamps with a slit on the box side for easy access. In 1958 a similar model 1573 was produced with an elongated letter plate. It was made from cream colored plastic.

in exporting came alive. Soon we had inquires from Europeans asking if they could represent us as sales agents. They had seen our scales and realized we had better values than the European manufacturers at that time. Soon we had agents in Belgium, Norway, Sweden, Switzerland and Finland.

Although we were growing slowly in the US against very stiff competition, the export business opened new outlets and we were very receptive. Several sales trips were made which resulted in rather substantial orders. In 1959 we learned about the Cologne Trade Fair in West Germany. I visited that fair in February, 1959. That year the English government removed import controls for English companies enabling them to buy goods outside the Sterling area and certain European countries. This opened the English market for imported scales from the US.

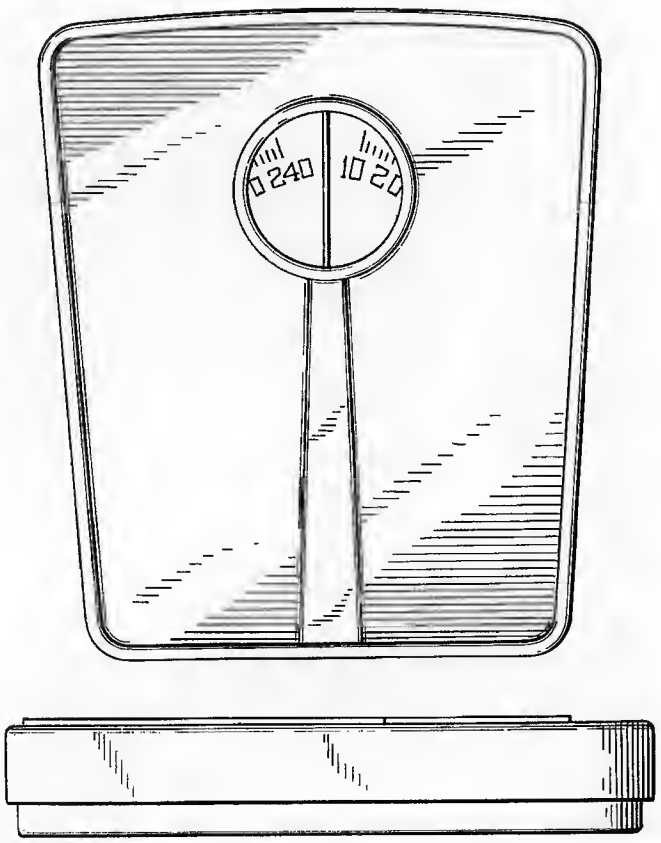


Fig. 8 ⩓⩓ Patent no. 3,077,941 was issued to the author on February 19, 1963. The lower illustration shows the side profile of this bathroom scale. This design changed the whole bath scale industry.

A letter was received from a Leonard McEwen in London looking to obtain a scale agency. An American friend in London investigated his company. He told us that McEwen knew the English market and was OK. That September I visited him in London and concluded a deal for him to import Hanson bath scales. We knew nothing about the UK market. It was dominated by the English firm Salter. The other scales were German which were mainly Stube & Krups. In early 1960, an order for 50,000 scales was received from Denewood Distributors, a UK company that provided promotional material for Embassy cigarettes.

Our Export Business was growing. I came to realize, at that time, if we were really to be successful selling in Europe, we had to have manufacturing facilities over there. Scotland and Holland were looked at. This is when my father and I started to have divergent opinions. He was emphatically opposed to our setting up in Europe.

During this period I developed a new scale design (fig. 8) using strip lever system. It was an integral combination of a spring and levers. Patents were granted. The new design enabled our scale to be built with three pounds of steel with a fairly low profile. These designs changed the whole bath scale industry.

Through a meeting hosted by the 1st National Bank of Chicago, I met a representative of Thomas Miner's company that consulted on how to export and locate manufacturing operations overseas. I hired them for a review of our export operations. They suggested looking at Ireland. They gave us

an impressive brochure put out by our Commerce Department which told about all the incentives the Irish government had to attract foreign manufacturers to locate there. I went to Ireland and met their representative and visited various government offices to learn about the Irish program. I was impressed with the meetings. My father, on my return, was not impressed when I briefed him on what I had been told.

The Irish government had changed their thinking about Ireland in early 1960. The young people as well as older ones were leaving the country in droves, as there were no jobs and no real industry. To solve the problem, the government set up the Irish Development Authority (IDA). This new authority was given great power to stem the tide of immigration. Their plan was to provide incentives for foreign companies to set up export manufacturing companies in Ireland. One part of the plan was to eliminate taxes for fifteen years on export profits. Another part was to grant cash incentives to companies that would bring in machinery to produce products that could be exported and of course create jobs. Naturally there were conditions that had to be met. In the beginning a company had to locate in the West of Ireland to receive cash grants. A grant could be as much as 80% of the cost of a factory building, and 40% of the cost of the machinery which had to be new.

In September 1961, I made another visit to Ireland during a sales trip to Europe. This time, I spent time to learn about what materials were available, the cost of steel, packaging, and how to ship out of Ireland. With this information, I put a proposal to the Irish Government to open a scale factory in the West of Ireland. It included all sorts of cost information, sales projections and everything I thought they should know. In January of 1962, I received a cable from Ireland to come and meet with the IDA (Irish Development Authority) grants committee and discuss my proposal. When the meeting was over, the committee went to executive session. Shortly after they came out and said "We like your proposal" and offered a substantial grant to start a new factory. Again, father was not impressed but he didn't try to stop me. Father did not want Hanson Scale to finance this. He asked "How and where are you going to get the money?" I think he thought this would stop me.

Since I felt so strongly about this, I went ahead with plans to locate a small factory in the town of Sligo. I set up an Irish Corporation called Hanson Ltd. I sold shares to family and a few friends including the English distributor McEwen. One friend was Hugo Fischer, a Swiss married to an American who was a neighbor. To protect the Hanson Scale Company, a licensing agreement was made with a provision for scale parts to be exported to Hanson Ltd. Hanson Scale did take 10% and father, after meeting some of the Irish folks, did invest. At a later date he gave his shares to his five grandchildren.

The new Hanson Company took advantage of the grants and located on a three acre site in Sligo. A 12,000 square foot factory building was built. Production started in July, 1963, with one 105 ton press. An excellent finishing system was installed. It was big enough to take care of projected growth. Internal parts were imported from Hanson Scale. The business turned a profit the first year and continued to grow. As my interest in Ireland grew it created more differences with my father.

In 1964, the US Government was pushing for exports. Through the Commerce Department, a plan was set up to give an 'E' for export award to companies that could prove what they had done to improve exports. I submitted a proposal, which was accepted. As one of the ten winners of the 'E' award, we were invited to the White House to receive the award from President Johnson.

Review

London Livery Company Apprentice Registers, Volume 41, Blacksmiths' Company 1605-1800, by C Webb, published by The Society of Genealogists Enterprises Ltd, 2004. ISBN 1 903462 75 4. Available from The Society of Genealogists Enterprises Ltd, 14 Charterhouse Buildings, Goswell Road, London, EC1M 7BA. 360 pages of lists and indices. Price £19.50 plus Postage & Packing.

This book is a dense list of all the apprentice bindings that have survived the vicissitudes that the original books went through. Having used the originals for many years I can commend Cliff Webb for his fantastic attention to detail in the face of impenetrably bad hand-writing, faded ink and burnt edges. I remember having red, aching eyes after every visit to the Guildhall Library, and the tedious journeys to see the originals.

So here they are, most of the scale-makers who lived and took apprentices in London. You have to know the name from some other source, as none of them has a label saying, "Scale-maker", and most of the members of Blacksmiths' Company had other trades, the majority being blacksmiths or whitesmiths. But look up, say, William Astill, find out that he was the son of a greengrocer, discover who trained him and trace his eight apprentices spread through his working life. Check the apprentices to see whether they became masters, and you will find that only one (Benjamin Matthew Payne) took apprentices. So maybe William Astill just wanted a reliable work-force that he'd trained himself, and didn't choose apprentices with initiative.

Even though some of our London scale-makers were in other guilds (many of which guilds have been abstracted and indexed by Cliff Webb previously) we have easy access now to some basic information about 300 or so of our scale-makers and maybe 1200-1500 of their apprentices. I find this book a wonderful tool, easy to use, and very cheap considering what you get. Buy it, and have fun doing a little research yourself!

D F C-H

Gaston's Scale Works

BY JAN BERNING

I had been intrigued by the folding steelyards when I came across them in the process of adding to my scale patent database. I had never seen one and assumed that, like many patents, they had never been manufactured and didn't exist.

Earlier this year, within a period of about two weeks, two of them appeared for sale on Ebay. I watched the auctions

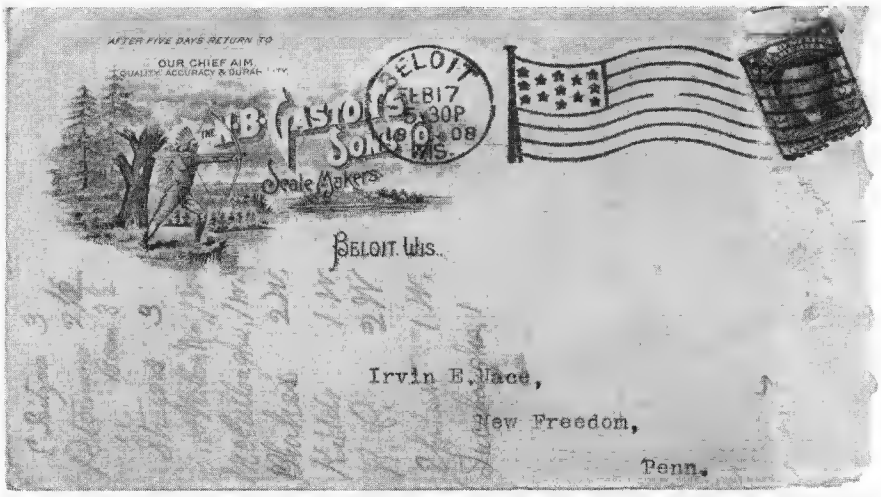


Figure 1 AA Postal cover from 1908, The N. B. Gaston's Sons Co, Beloit, Wis. showing their logo of an American Indian Chief shooting an arrow.

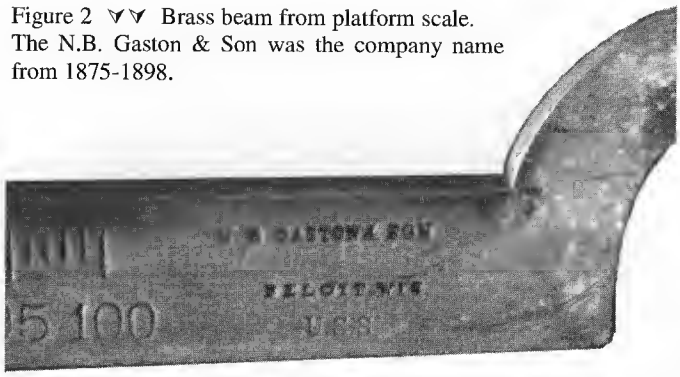


Figure 2 ⋎⋎ Brass beam from platform scale. The N.B. Gaston & Son was the company name from 1875-1898.

and noticed that a fellow collector had bought one of them. In August of this year, on a trip down south, we were invited to visit with a dear friend and member of ISASC. As we were looking over her large scale collection, we were shown a scale in a box. I immediately recognized the scale as the folding steelyard! The patent date was cast into the bottom of the cast iron pan. I knew I had the patent for it but could I find it in my mounds of printed patents? I arrived home, found the patent, and was perusing Ebay when I spotted a cover (postal envelope and billhead) for N B Gaston's Sons Co.; Scale Makers. I was able to buy it and it arrived later that week. When I searched my data base for Gaston two patents were found, both attributed to A J Gaston and both were for folding steelyards. Then I noticed that the scale company was in Beloit, Wisconsin. A web search came up with several interesting pages of information on N B Gaston. I telephoned the Historical Society in Beloit and asked for information. I was told that they had two files on Gaston and his scale company. I asked them to hold them for me until I was able to get to Beloit. I also found information on the Gaston family and called the researcher to request a copy of the family tree.

The following week we went to Beloit for business (Bill has a scale on location there) and to do research. Walking into the Society, the first thing we noticed was a huge Fairbanks platform scale in the lobby. It is interesting to note that Fairbanks has a huge plant located in Beloit. We spent several hours at the Historical Society photo-copying the information that they had on Gaston and his scale company. We were about to leave for lunch when the curator mentioned that there were scales at the Hanchett-Bartlett Homestead and asked if we had been there. I asked if there was any way we could go there to see and photograph the scales. This was arranged on the spur of the moment.

When we arrived at the homestead we were told the scales were in the barn. As we walked into the barn there was a gigantic Fairbanks pit scale, without the pit, on our right. To the left against the back wall of the barn were five or six smaller platform scales. These were all marked Gaston.

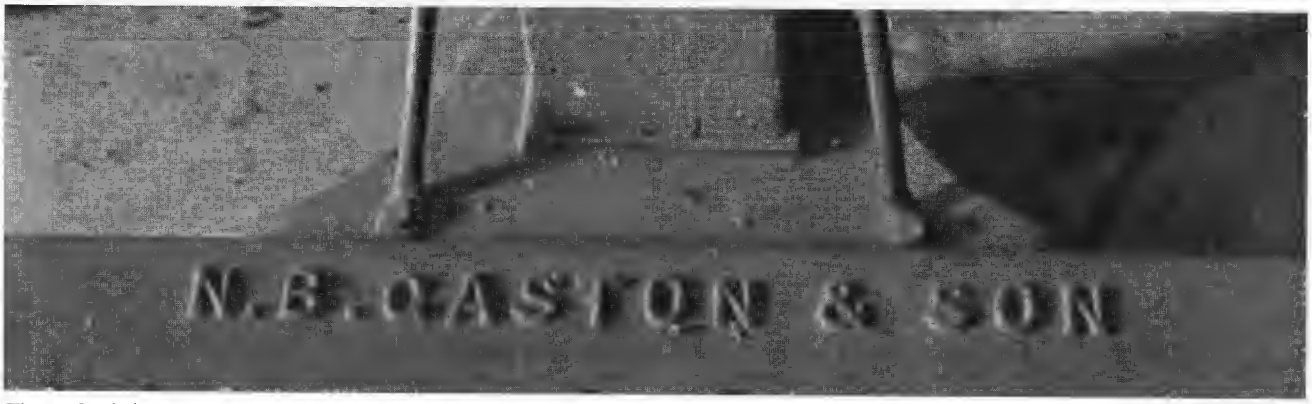


Figure 3 ⋏⋏ Platform from scale dating from 1875-1898. There were five or six of these scales of varing sizes in the barn at the Hanchett-Bartlett Homestead. The home and barn date from 1857, are decorated in period style and well worth a visit.

Figure 4 ➢➢ Pan, marked Manufactured by the Folding Scale Co., Beloit, Wis., from folding steelyard. The lever on the left is a lock to keep the scale pan from folding when in use and to keep it from unfolding when it is stored flat against the wall. There is no record of Gaston ever using the Folding Scale Co. for the name of his firm.

Unfortunately they were impossible to photograph well. Hung on one of these platform scales was a folding pan (figure 4) like I had seen in the patent drawings but there were no complete folding steelyards. This pan was marked "Manufactured by The Folding Scale Co. Beloit, Wis. U.S.A." We were given a tour of the home as well and told that there were scales back at the Historical Society.

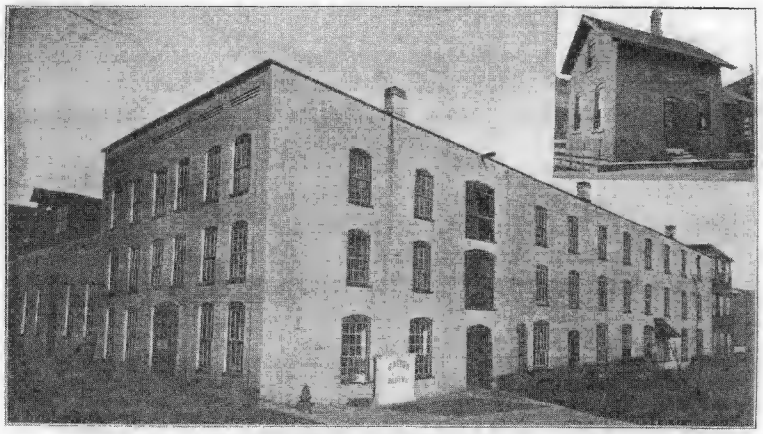
Now for the Gaston scale story.

Nathan Brockway Gaston was born on March 17, 1810 near Auburn, New York. When he was still very young he was apprenticed to a gunsmith for a year. He moved to Rochester, NY for one year where he made gun locks. In 1832 he moved to Albany, NY where he met and married the State Librarian, Amelia Tillinghast on Feb. 8, 1835. He attempted to farm for a year in Genesee County but learned he was not an agriculturist and returned to Rochester to work.

It was during his time in Rochester that he learned the scale building trade. The Rochester Scale Works had been established in 1841, and it is here that he probably learned the trade. At that time the Rochester Scale Works was the only scale factory in Rochester, and may have used water power which was established in Rochester in 1812.

Nathan Gaston's wife died in October of 1842 leaving one daughter, Maria. Gaston married his first wife's cousin, Ann Battin on August 29, 1844, and they left, with her family, that day to go to the mid-west because he believed the west offered more opportunity for a scale maker.

The Augustine J Battin and Nathan B Gaston families arrived in Beloit, Wisconsin in September of 1844, when there was only one house in West Beloit. Wisconsin was not yet a state. There they bought a lot, with an existing small building, on the west side of the Rock River and Nathan started building scales. This was the first manufacturing establishment in the city of Beloit.



SCALE WORKS OF THE N. B. GASTON'S SONS CO., BELOIT, WIS.

Figure 5 ⮝⮝ Gaston Scale factory. The Gaston Scale Works remained on the original property during its entire tenure in business. The factory was on the west side of the Rock River and was the first in Beloit to use water power. Note the Gaston wagon scale by the entrance.

At first N B Gaston Scale Company had three employees and all the scales were built by hand. The early scales produced by the young company were platform scales for farm use in the area. They were loaded on a wagon and taken door to door for selling.

In 1845, Battin and Gaston helped with the financing of a dam on the Rock River and built a race to create water power for the scale company. This was the first water powered factory in Beloit.

In 1847, the A J Battin and N B.Gaston families had built a 38 room, three story, cobblestone, double house with winding stairways and double entry doors. Each family had 19 rooms and it was equipped with at least 6 fireplaces for heating. The Gastons lived in the north side of the house and the Battins lived in the south side. The grounds were well landscaped and extended four blocks to the Rock River.

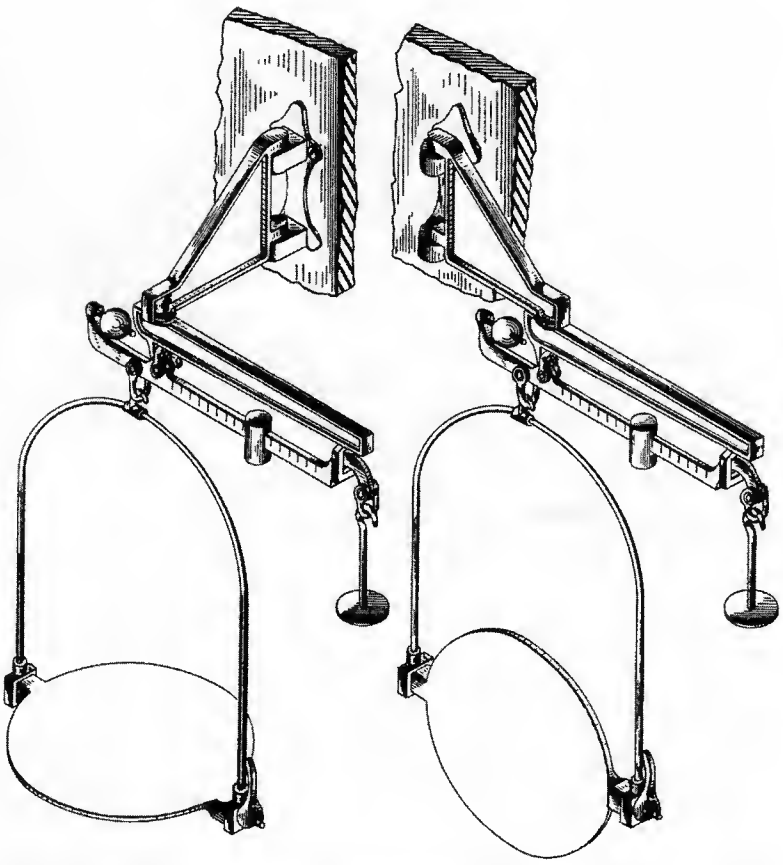


Figure 6 ⩓⩓ Augustine Gaston was issued patent no. 437,379 on September 30, 1890 for a folding family scale. His scale could be folded flat against the wall when not in use thus freeing valuable counter space in the late 1800s kitchen or cook house.

By 1849, his (Gaston's) *business had grown to the extent that he decided to locate here permanently and he bought the factory site and water rights from Mr. Battin, his father-in-law.* In the early years *cash was scarce, so Mr. Gaston would exchange a scale for a cord of wood, farm produce, or some other commodity he or his workmen might need. These items were loaded on a wagon and returned to Beloit, where he distributed the goods to his workmen in lieu of cash wages. This system was employed for a number of years*[1].

In 1875, Nathan Brockway Gaston's oldest son Augustine James (Gus) Gaston joined the firm and the name was changed to N B Gaston and Son Company. About 1886 the factory was rebuilt and enlarged to meet the large demand for their scales. In early 1890, Augustine had an idea for a new type of family scale. He applied for a patent and on September 30, 1890 he was granted patent number 437,379 for a pivoting steelyard (figure 7). His scale was complete with a folding pan and bracket for hanging. When not in use the scale could be swung against the wall and the pan folded so that bracket, scale and pan were flat against the wall. It could be used when needed and folded up against a wall at other times. It didn't require counter-top space, like most family scales of the day and it had no springs. The family scales were made of cast iron with a brass beam graduated from one to five pounds. They are extremely heavy and well made.

Apparently Gus' folding family steelyard sold well because only four years later he applied for another scale patent. This patent, too, was for a pivoting steelyard with a folding pan. Patent number 538,252 (figure 10) was issued to A J Gaston on April 30, 1895, for a double-beamed steelyard and folding bracket and pan specifically for use in dairies. The bail for the pan was longer on the dairy scale so that it sat on the barn or dairy floor. The dairy scale was equipped with a lever whereby the scale, beam, and plate could be raised vertically off the floor after the load was applied to the platform. A heavy cream can or container could be placed on the platform at floor level after which the lever was utilized to raise the loaded platform off the floor for weighing.

Figure 7 ⅄⅄ Gaston's patent no.437,379 was more decorative than shown on the patent drawing. It was made from heavy cast iron and had no useful tare. The beam was graduated from zero to five pounds. The scale is shown folded flat. The lever at right was for secureing the goods plate.

Apparently the scales designed and patented by Augustine Gaston sold well. Eight years later, in 1898, at the age of 50, Gus retired and sold his interest in N B Gaston and Son Company to his brothers Thomas Edgar and Theodore Irving Gaston. The scale company was renamed N B Gaston and Sons Company to include the newest owners.

After Nathan Brockway Gaston passed away on July 16, 1900, in Beloit, his widow, Anna Eliza Gaston, became President of the scale company. She remained its president through at least the year 1906. The firm name in 1906, as stated in the Beloit City Directory was N B Gaston Sons.

By 1908, the company name had again been altered to reflect the owners and was listed as The N.B. Gaston's Sons Company. The officers were Thomas Edgar Gaston, President, his wife Emma Heivly Gaston, Vice President and Theodore Irving Gaston, Secretary and Treasurer. The factory employed 50-60 workers and the annual output was valued at about $60,000. Apparently they continued to sell Augustine's patented folding scales as their billhead states *portable creamery, dairyman's, hopper, grain, dormant, wagon, stock and dump scales. Also the celebrated folding creamery scale.* The bill also stated that they sold *Gaston's patent paint mills of all sizes with or*

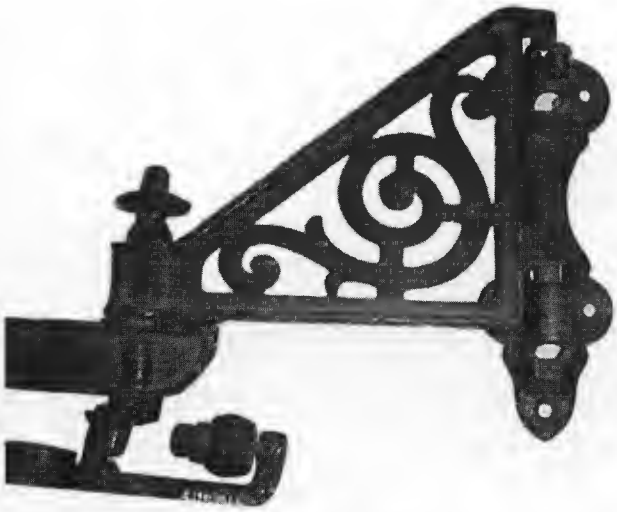


Figure 8 ⅄⅄ Detail of ornate hanging bracket for Gaston's family scale.

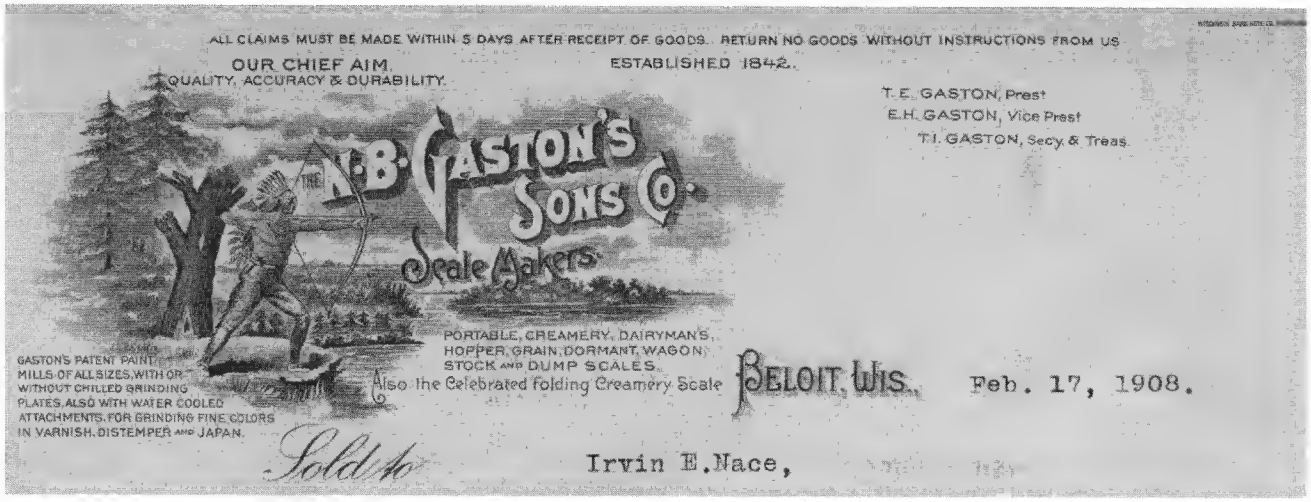


Figure 9 ⮝⮝ This 1908 billhead lists all the products made by the N.B. Gaston's Sons Co. In addition to scales they made paint mills. Their chief aim was quality, accuracy and dependability. The billhead also lists the officers of the company. Augustine Gaston, the patentee, had retired in 1898, only 8 years after his first scale patent was issued. The firm was still producing his folding dairy scale in 1908. Has any member seen one of these dairy scales?

without chilled grinding plates, also with water cooled attachments, for grinding fine colors in varnish, distemper and Japan.

The company remained under this name and leadership through 1919 but it is possible that at some point Thomas Edgar's son Thomas Edgar II may have taken his father's place at the firm. This seems especially likely since a genealogy done by the family notes that Thomas Edgar Gaston, son of Nathan B Gaston, died in Los Angeles, California in December 1915. In 1920 the city directory lists Thomas Edgar as President, Emma as Vice President, Theodore as Secretary and A G as Treasurer. Records do not indicate the full name of A G (Arthur? Son of Thomas Edgar Gaston) and some records are in conflict as to the firm's history at this point stating that the firm was sold to Lewis Waldo Thompson in 1919, and its name was changed to Gaston Scale Co. Water rights were relinquished in 1931 when electricity was installed in the plant. Gaston Scale Co.

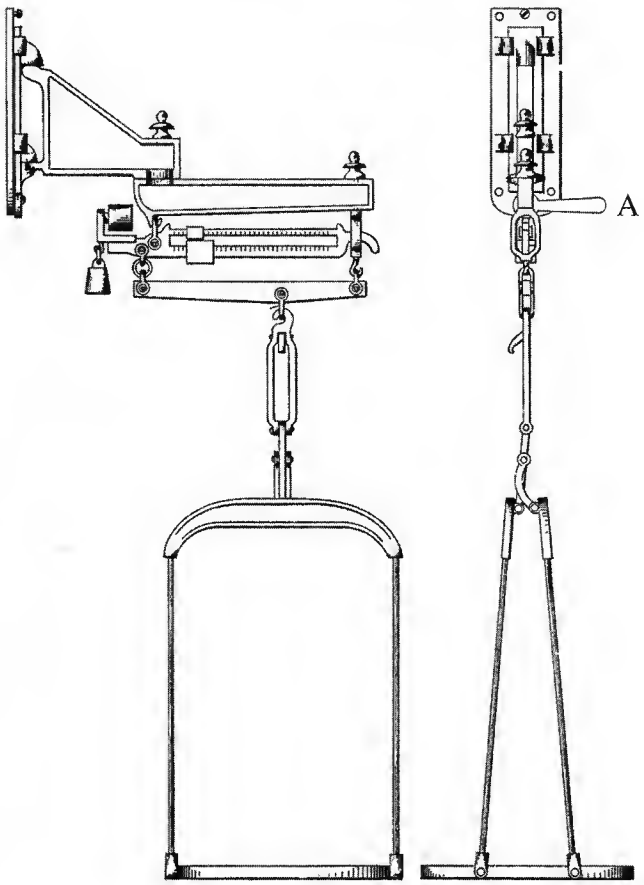


Figure 10 ➢➢ Augustine Gaston's patent no.538,252 was issued April 30, 1895, for a hanging dairy scale. This scale is known to have been produced and was advertised in 1908 as *the celebrated folding creamery scale.* The lever A was used to raise the scale, beam, and plate off the floor after the milk container was placed on the platform.

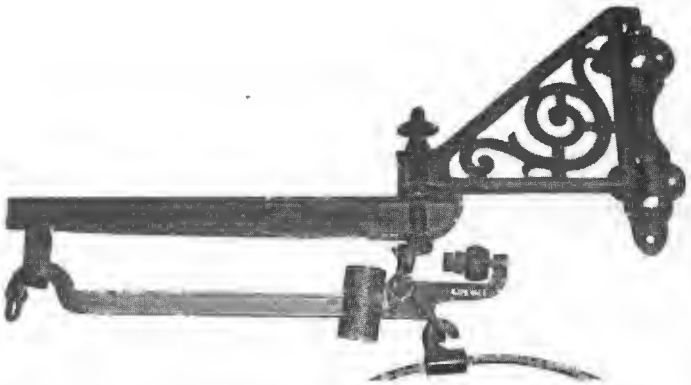


Figure 11 ⮝⮝ Bracket and beam detail from scale pictured in Figure 7. This scale is based on Gus Gaston's patent no. 437,379.

Figure 12 ⮝⮝ This brass tag was found on a platform scale owned by the Beloit Historical Society. It dates the scale between 1919 and 1938.

continued in business until 1938, making platform and wagon scales. During this period Lewis Waldo Thompson was President and W B Leishman was Vice-President.

Throughout the years the N. B. Gaston Scale Works became a manufacturing institution which produced thousands upon thousands of scales, spreading the name and the fame of Beloit to all corners of the world. It continued in operation for almost a century occupying till the end its first site and buildings[2].

A walk around the city of Beloit reveals that Nathan Brockway Gaston truly left his mark on this city. In 1938 he was one of the first people to be inducted into the Beloit "Hall of Fame." There is a Gaston Drive and Gaston Elementary School was named for him. The building that Gaston Scales called home for 94 years was incorporated into a new building within the Beloit Iron Works campus in the 1940's. That building still stands in Beloit.

Notes & References:

1. *Book of Beloit 1836-1936.* Beloit, WI: n.p., 1936. 221-222.

2. Compliments Beloit Historical Society

3. Hansen, Blaine. "Century Old Cobblestone House of Pioneer Beloiters Being Repaired." Beloit Free Press 6 Aug. 1949.

4. *Beloit, Wisconsin City Directory.* Beloit, Wisconsin: various dates 1857-1936, non-inclusive.

5. *Portrait & Biographical Album of Rock County, Wisconsin.* Chicago, IL: Acme Co., 1889. 529-530.

The author wishes to thank the following for their help in completing this article:

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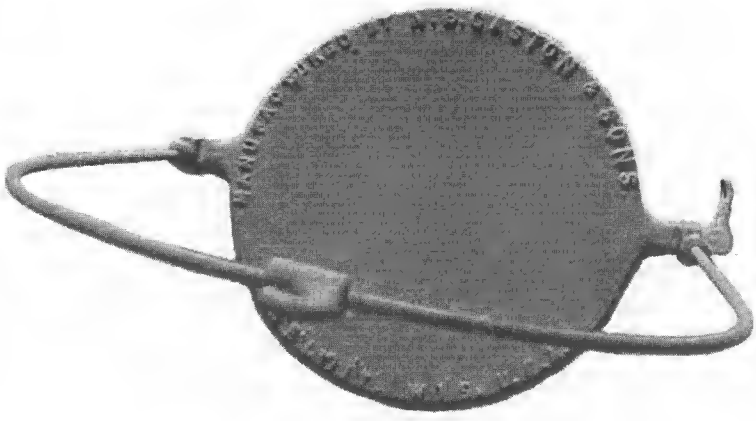

Figure 13 ➢➢ Close-up of platform or pan from scale shown in figure 7. This scale can be dated by the inscription. "Manufactured by N B Gaston & Sons." It was manufactured between 1898 and 1906.